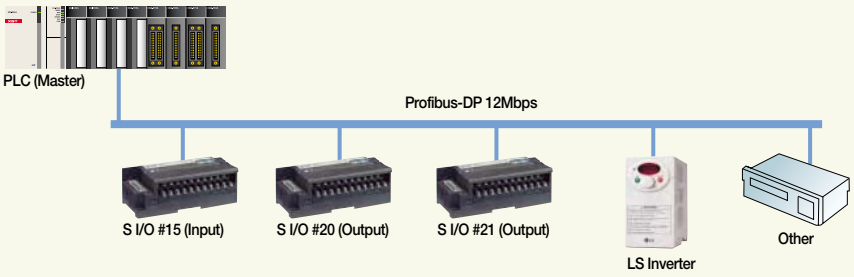
High-speed link communication among PLCs

XGT can create 'Distributed Control System' with Smart I/O, Inverter, pneumatic device via Profibus-DP.
In this case, PLC is the master and the other devices such as Smart I/O are slaves.
It just needs SyCon, basic parameter and High-speed link setting.

Configuration

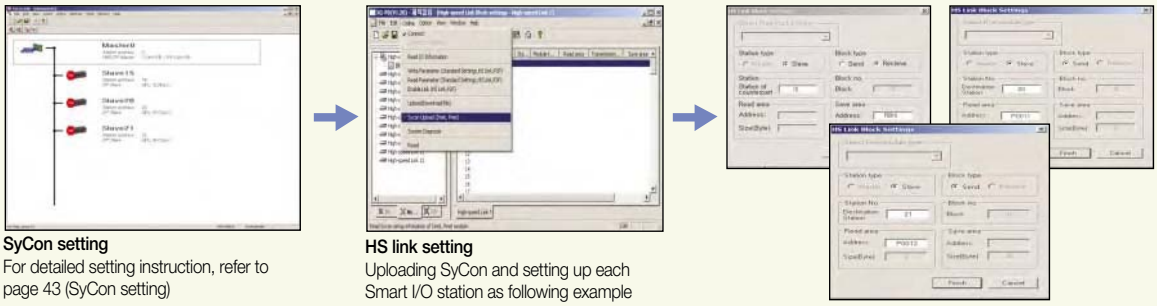
PLC controls each Smart I/O (16-point).



Data memory

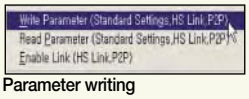
Smart I/O #	Smart I/O address	PLC address	Setting item
15	P0000	P0010 (P00100~P0010F)	1. SyCon setting 2. XG-PD parameter setting, 3. XG5000 programming
20	P0000	P0011 (P00110~P0011F)	
21	P0000	P0012 (P00120~P0012F)	

XG-PD setting

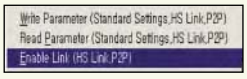


SyCon setting
For detailed setting instruction, refer to page 43 (SyCon setting)

HS link setting
Uploading SyCon and setting up each Smart I/O station as following example



Parameter writing
Downloading parameters to PLC after online connection

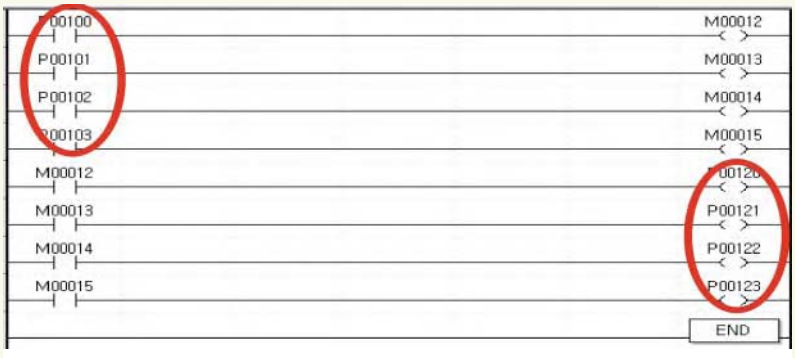


Enable Link
Enabling link for communication start

* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

XG5000 programming

Write a program using I/O address of Smart I/O Pnet



Network

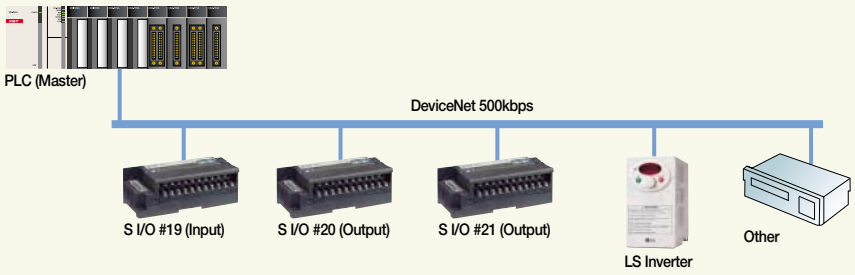
Network / Communication example (DeviceNet)

High-speed link communication between PLCs

XGT can create 'Distributed Control System' with Smart I/O, Inverter, pneumatic device via Dnet.
In this case, PLC is the master and the other devices such as Smart I/O are Slaves.
It just needs SyCon, basic parameter and High-speed link setting.

Configuration

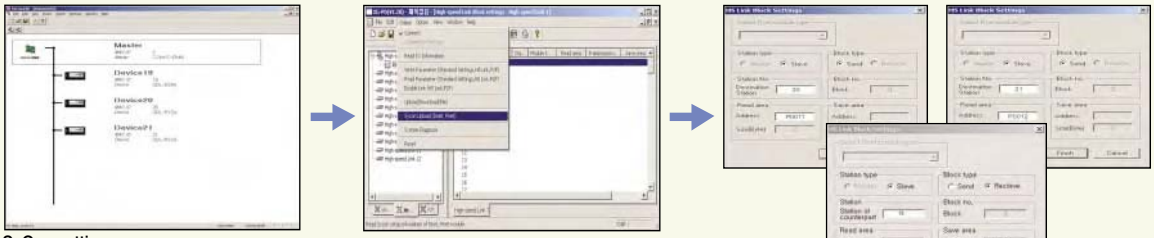
PLC controls each Smart I/O (16 points).



Data memory

Smart I/O #	Smart I/O address	PLC address	Setting item
19	P0000	P0010 (P00100~P0010F)	1. SyCon setting 2. XG-PD parameter setting, 3. XG5000 programming
20	P0000	P0011 (P00110~P0011F)	
21	P0001	P0012 (P00120~P0012F)	

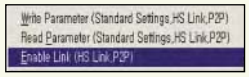
XG-PD setting



SyCon setting
For detailed setting instruction, refer to page 43 (SyCon setting)

HS link setting
Uploading SyCon and setting up each Smart I/O station as following example

Parameter writing
Downloading parameters to PLC after online connection

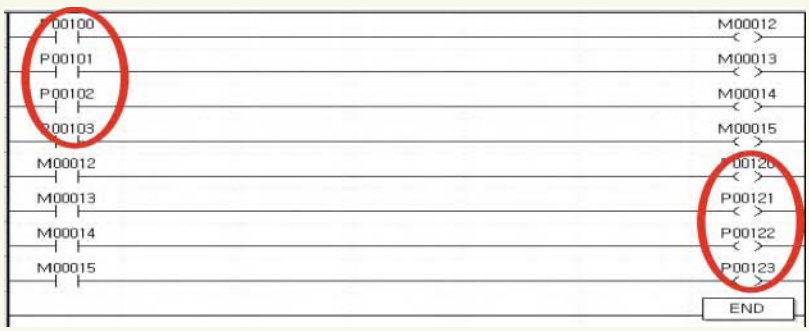


Enable Link
Enabling link for communication start

* For basic parameter setting and SyCon setting/change, reset the module (Online reset).

XG5000 programming

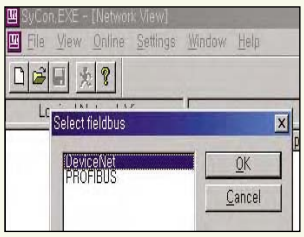
Write a program using I/O address of Smart I/O Dnet.



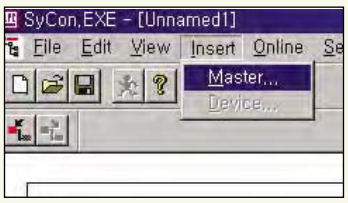
Network / Communication example (SyCon setting Profibus, DeviceNet)

SyCon is the dedicated software that help user set up the communication environment for Profibus-DP and DeviceNet more easily and conveniently.

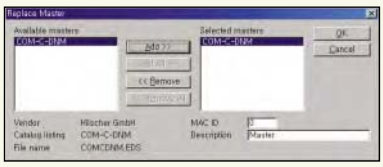
Example of application



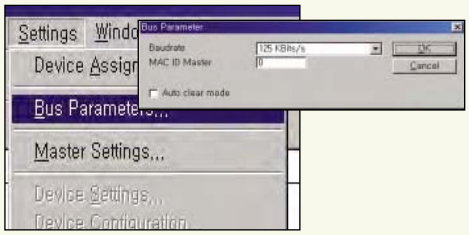
New file
Select fieldbus that is used.



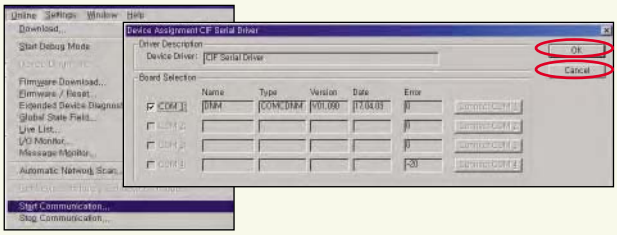
Basic communication parameter setting
Select [Master] in Insert menu.



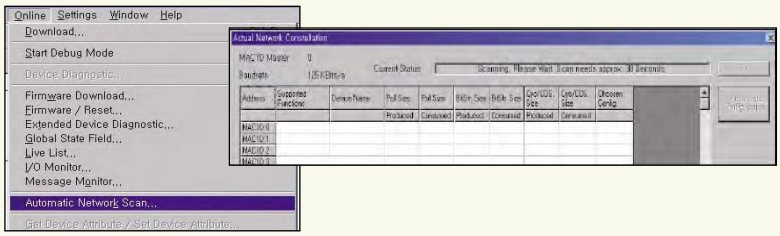
Master module setting
Select [COM-C-DNM] for DeviceNet.
Select [COM-C-DPM] for Profibus-DP.



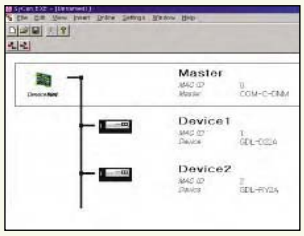
Bus parameter setting
Set up communication speed of master module.



Master module setting
After clicking the port button, check the right check-box.

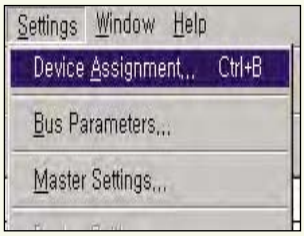


Automatic network scan of connected Smart I/O
Perform automatic network scan after station number setting and wiring with remote device such as Smart I/O.
At this time, all remote devices should be in normal connection (Power-On, etc).
After network scan is completed, press [Automatic Configuration] button and [OK] button.



Network checking
Check normal network (remote) condition.

Parameter download



Disconnect
Disconnect the port in Device Assignment.

Network / Smart I/O (Stand alone)

Features

- Wiring reduction and real time control of distributed I/O
- Supporting Rnet, DeviceNet, Profibus-DP, MODBUS (RS-422/485)
- Various I/O (DC/TR/Relay) modules with the unit of 16/32 points

Digital I/O specifications

Item		Input		Output			Mixed module	
		DC (Sink/Source)		Transistor (Sink)		Relay	DC (Sink/Source)	Transistor (Sink)
No. of point		16	32	16	32	16	16	16
Rated input (Load voltage)		DC 24V		DC 24V		DC 24V/AC 110V/220V	DC 24V	DC 24V
Input current (Load current)		7mA		0.1A/2A, 0.5A/3A		2A/5A	7mA	0.1A/2A, 0.5A/3A
Response time	Off → On	3ms or less		3ms or less		3ms or less	3ms or less	3ms or less
	On → Off	3ms or less		3ms or less		3ms or less	3ms or less	3ms or less
Common		16 points/COM		16 points/COM		16 points/COM	16 points/COM	16 points/COM
Current consumption		200mA	300mA	280mA	380mA	550mA	350mA	
Network	Rnet	GRL-D22A	GRL-D24A	GRL-TR2A	GRL-TR4A	GRL-RY2A	GRL-DT4A	
	Profibus-DP	GPL-D22A●	GPL-D24A●	GPL-TR2A▲	GPL-TR4A▲	GPL-RY2A●	GPL-DT4A▲	
	DeviceNet	GDL-D22A●	GDL-D24A●	GDL-TR2A▲	GDL-TR4A▲	GDL-RY2A●	GDL-DT4A▲	
	MODBUS	GSL-D22A	GSL-D24A	GSL-TR2A	GSL-TR4A	GSL-RY2A	GSL-DT4A	

Note1) Specification stated in the table is specification of type A.
Refer to XGT user' s manual.
● A, C ▲ A, A1, B, C, C1

A Sink, Rated current: 0.1A, terminal fixed type
A1 Sink, Rated current: 0.5A, terminal fixed type
B Source, Rated current: 0.5A, terminal fixed type
C Source, Rated current: 0.5A, terminal separated type
C1 Sink, Rated current: 0.5A terminal separated type

Analog I/O specifications

Item	GPL-AV8C	GPL-AC8C	Item	GPL-DV4C	GPL-DC4C
Input channels	8 channels		Output channels	4 channels	
Analog input	DC 1~5V, 0~5V, 0~10V, -10~+10V	0~20mA, 4~20mA, - 20~20mA	Digital input	0~4000, 0~8000, -8000~8000	0~8000
Digital output	0~4000, 0~8000, -8000~8000	0~4000, -8000~8000	Analog output	DC 1~5V, 0~5V, 0~10V, -10~+10V	0~20mA, 4~20mA
Input impedance	1MΩ	250 Ω	Load impedance	1KΩ or more (0~5V or 1~5V) 2KΩ or more (0~10V or -10~10V)	500 Ω or less
Max. resolution	±15V	±30mA			
	1.25mV	2.5㎂	Resolution	1.25mV	2.5㎂
Accuracy	±0.3% (full scale, Ta=0~55°C)	±0.3% (full scale, Ta=23°C±5°C) ±0.4% (full scale, Ta=0~55°C)	Accuracy	±0.3% (full scale, Ta=0~55°C)	±0.3% (full scale, Ta=23°C±5°C) ±0.4% (full scale, Ta=0~55°C)
Conversion speed	10ms or less / 8 channel		Conversion speed	10ms or less / 4 channel	
Response period	10ms or less / 8 channels + Transmission period (ms)		Response period	10ms or less / 8 channels + Transmission period (ms)	
Insulation method	Analog input/output terminal with FG→Insulation		Insulation method	Analog input/output terminal with FG→Insulation	
	Analog input/output terminal with Communication terminal→Insulation			Analog input/output terminal with Communication terminal→Insulation	
	Analog input/output terminal with each channel→No insulation			Analog input/output terminal with each channel→No insulation	
External power supply	DC24V (21.6 ~ 26.4)		External power supply	DC24V (20.4 ~ 28.8)	
External current consumption	DC24V : 220mA		External current consumption	210mA	240mA
Weight (kg)	0.313	0.313	Weight (kg)	0.314	0.322

Communication specifications

Item	Rnet (Dedicate network for LSIS Smart I/O)	Profibus-DP	DeviceNet	MODBUS
Protocol	LSIS dedicated protocol (Fnet for Remote)	Profibus-DP (RS-485/EN50170)	DeviceNet (CAN)	MODBUS (RS-422/485)
Transmission speed	1Mbps	9.6kbps ~ 12Mbps	125/250/500Kbps	2.4Kbps ~ 38.4Kbps
Transmission distance	750m/segment	100m ~ 1.2Km	500/250/125m (Thin cable: 100m)	500m
Topology	Bus Token	Bus	Trunk & Drop	Bus
Transmission	Pass & Broadcast	Token Pass & Master/Slave (Poll)	CSMA/NBA (Poll, Cyclic, COS, BitStrobe)	Master/Slave (Poll)
No. of stations	32/segment (Input: 32, Output: 32)	32/segment, 99/network	64	32
Link capacity	2,048 points/master (64 stations ×32 points)	7Kbyte/master	2,048 points/master	64 points/station

Note1) Smart I/O supports Poll type currently, but is supposed to support Cyclic, COS and Strobe later on.

Network / SMART I/O (DeviceNet adapter)

Features

- Max. 63 stations
- Flexible connection via DeviceNet
- Utilize same I/O modules with XGB
  - Max. 512 I/O points
  - Max. 32 channels analog input/output

Specification

Items		Description		
Communication Specification		Poll, Bit-strobe, COS/Cyclic		
		Group 2 only slave		
		Auto baud rate		
Module's Type		Slave		
Max. Node Number (MAC ID)		64(0~63)		
Number of Expansion I/O Slots		8		
Max. DC I/O Data Size		Input:32bytes / Output:32bytes		
Max. Analog Channels		Input : 16Channels / Output : 16Channels		
Speed & Distance	Comm. Speed	125 kbps	250 kbps	500 kbps
	Distance	500 m	250 m	100 m
Input Power	System Power	DC 24V		
	Range	19.2V ~ 28.8V(11V operate)		
	Output Voltage/ Current	5V(±20%) /1.5A		
Weight(g)		100		

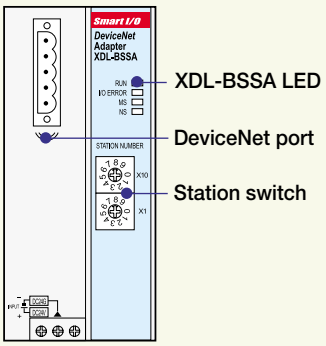
* When I/O module is installed, check the current consumption (Max. Current: 1.5A)

System configuration

Items		Description	Max. I/O point
Digital I/O	XBE-DC08A	DC24V input 8pt	256points
	XBE-DC16A	DC24V input 16pt	
	XBE-DC32A	DC24V input 32pt	
	XBE-RY08A	Relay output 8pt	
	XBE-RY16A	Relay output 16pt	
	XBE-TN08A	Tr output 8pt, Sink	
	XBE-TP08A	Tr output 8pt, Source	
	XBE-TN16A	Tr output 16pt, Sink	
	XBE-TP16A	Tr output 16pt, Source	
	XBE-TN32A	Tr output 32pt, Sink	
	XBE-TP32A	Tr output 32pt, Source	
	XBE-DN16A	DC24V input 8pt , Tr output 8pt	
Analog, Temperature	XBF-AD04A	Current/Voltage input 4Ch	16channels
	XBF-DC04A	Current output 4Ch	
	XBF-DV04A	Voltage output 4Ch	
	XBF-RD04A	RTD input 4Ch	
	XBF-TC04S	TC input 4Ch	

* When Digital input and Analog input is used together or Digital output Analog output is used, configure the system within 32bytes
(Ex) If 4ch analog input is used, Digital input can be used max. 192points

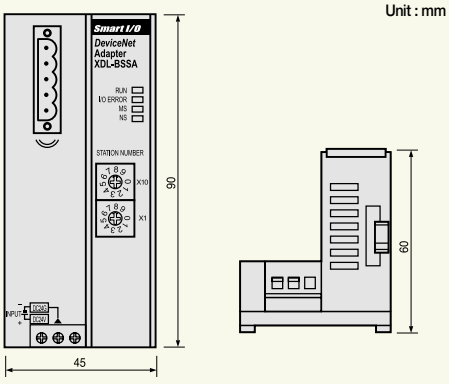
Externals and inscriptions



Item	LED status
RUN	ON : Normal
	OFF : Module error
I/O ERROR	ON : I/O module error
	OFF : Normal
MS	Green ON: Normal
	Green blink: Normal
	Red ON: Module error
NS	Green ON: Normal
	Green blink: Waiting
	Green off: Comm. stop
	Red ON: Network error
	Red blink: Disconnect

Dimension

Unit : mm



Network / SMART I/O (Profibus-DP adapter)

Features

- Max. 100 stations (32stations per segment)
- Flexible connection via Profibus
- Utilize same I/O modules with XGB
  - Max. 512 I/O points
  - Max. 32 channels analog input/output

Specification

Item			Performance Specification				
Transmission	Standard		EN50170 / DIN 19245				
	Interface		RS-485(Electric)				
	Media Access		Polling				
	Topology		BUS				
	Encoding Method		NRZ				
	Interface		Sync mode , Freeze mode Auto baud rate				
	Master/Slave		Slave				
	Cable Type		Twisted Pair Shielded Cable				
	Comm. Distance	Kbps	9.6	19.2	93.75	187.5	500
		m	1200	1200	1200	1000	400
		kbps	1500	3000	6000	12000	-
		m	200	100	100	100	-
	Max. Node Number		100 (0 ~ 99)				
	Number of Expansion I/O Slots		8				
	IO Data Size		64bytes (Input:32bytes /Output:32bytes)				
	Number of Analog Channels		32Channels (Input : 16Channels/Output :16Channels)				
Input Power	System Power		Supply Voltage : DC 24Vdc 19.2 ~ 28.8Vdc				
	Output Voltage/ Current		5V(±20%) / 1.5A				
Weight(g)			100				

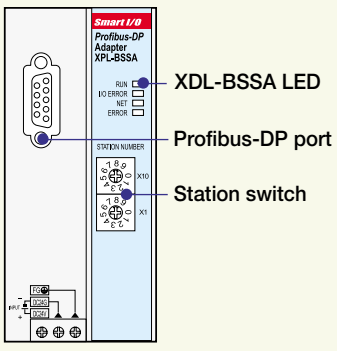
* When I/O module is installed, check the current consumption (Max. Current: 1.5A)

System configuration

Item	Description		Max. I/O point
Digital I/O	XBE-DC08A	DC24V input 8pt	256points
	XBE-DC16A	DC24V input 16pt	
	XBE-DC32A	DC24V input 32pt	
	XBE-RY08A	Relay output 8pt	
	XBE-RY16A	Relay output 16pt	
	XBE-TN08A	Tr output 8pt, Sink	
	XBE-TP08A	Tr output 8pt, Source	
	XBE-TN16A	Tr output 16pt, Sink	
	XBE-TP16A	Tr output 16pt, Source	
	XBE-TN32A	Tr output 32pt, Sink	
	XBE-TP32A	Tr output 32pt, Source	
	XBE-DN16A	DC24V input 8pt , Tr output 8pt	
Analog, Temperature	XBF-AD04A	Current/Voltage input 4Ch	16channels
	XBF-DC04A	Current output 4Ch	
	XBF-DV04A	Voltage output 4Ch	
	XBF-RD04A	RTD input 4Ch	
	XBF-TC04S	TC input 4Ch	

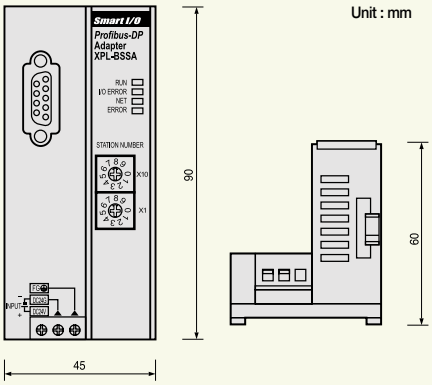
* When Digital input and Analog input is used together or Digital output Analog output is used, configure the system within 32bytes
(Ex) If 4ch analog input is used, Digital input can be used max. 192points.

Externals and inscriptions



Item	LED status
RUN	ON : Normal
	Blink: Waiting or comm. error
	OFF : Module error
I/O ERROR	ON : I/O module error
	OFF : Normal
NET	ON : Data send/receive
	OFF : Disconnection
ERROR	ON : Comm. error
	OFF : Normal

Dimension



Network / SMART I/O (Rnet adapter)

Features

- Max. 63 stations
- LS dedicated protocol (Rnet)
- Utilize same I/O modules with XGB
  - Max. 512 I/O points
  - Max. 32 channels analog input/output

Specification

Item		Performance Specification
Transmission	Tran. Rate	1Mbps
	Transmission Path	Bus type
	Method	750m
	Max. Cable Length	5 pin connector
	Connector type	Twisted Pair Shielded Cable
	Cable type	32(non-used repeater),
	No. of Station	64(used repeater)
	(Included Master)	512(Input : 256, Output: 256)
	Max. Digital I/O points	96
	Max. Analog I/O points	Digital I/O 8
	Number of I/O Slots	Analog I/O 4
	Selection of Latch/Clear	handling of mode change switch
Rated Voltage/current		DC24V/0.55A
Weight (g)		100

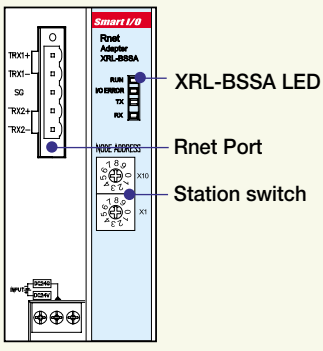
* When I/O module is installed, check the current consumption (Max. Current: 1.5A)

System configuration

Item	Description		Max. I/O point
Digital I/O	XBE-DC08A	DC24V input 8pt	256points
	XBE-DC16A	DC24V input 16pt	
	XBE-DC32A	DC24V input 32pt	
	XBE-RY08A	Relay output 8pt	
	XBE-RY16A	Relay output 16pt	
	XBE-TN08A	Tr output 8pt, Sink	
	XBE-TP08A	Tr output 8pt, Source	
	XBE-TN16A	Tr output 16pt, Sink	
	XBE-TP16A	Tr output 16pt, Source	
	XBE-TN32A	Tr output 32pt, Sink	
	XBE-TP32A	Tr output 32pt, Source	
	XBE-DN16A	DC24V input 8pt , Tr output 8pt	
Analog, Temperature	XBF-AD04A	Current/Voltage input 4Ch	16channels
	XBF-DC04A	Current output 4Ch	
	XBF-DV04A	Voltage output 4Ch	
	XBF-RD04A	RTD input 4Ch	
	XBF-TC04S	TC input 4Ch	

* When Digital input and Analog input is used together or Digital output Analog output is used, configure the system within 32bytes
(Ex) If 4ch analog input is used, Digital input can be used max. 192points.

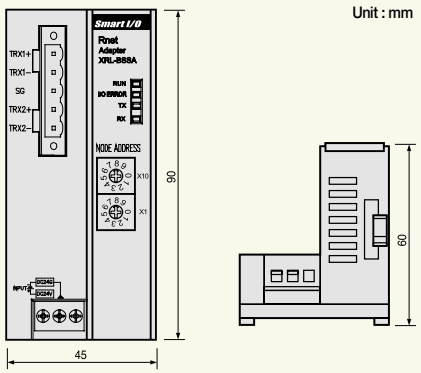
Externals and inscriptions



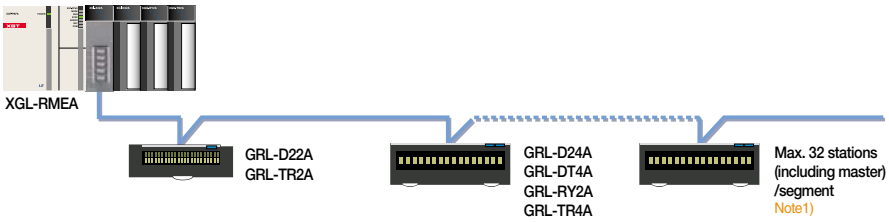
Item	LED status
RUN	ON : Normal
	OFF : Module error
I/O ERROR	ON : I/O module error
	OFF : Normal
TX	Data send
RX	Data receive

Dimension

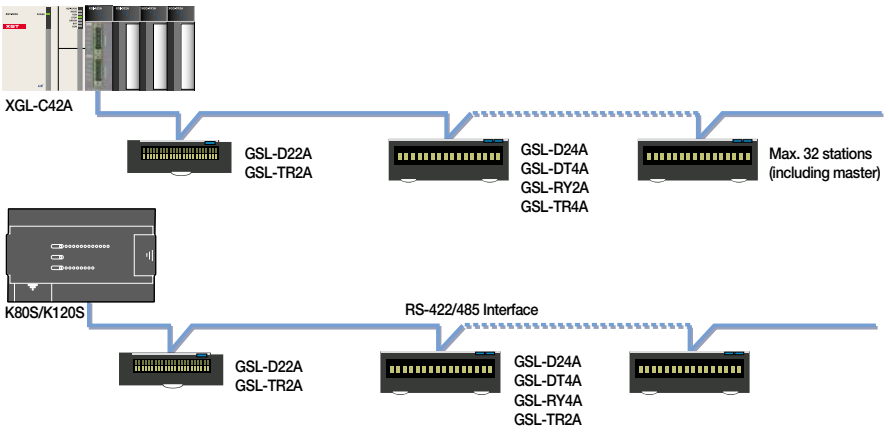
Unit : mm



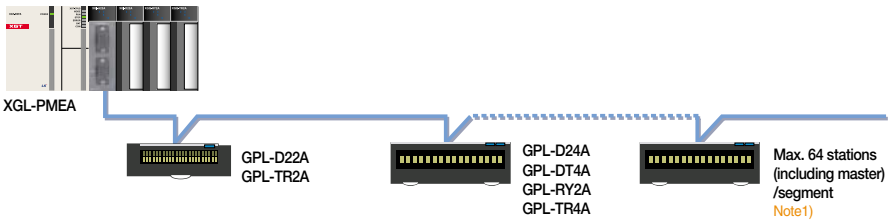
Smart I/O Rnet system



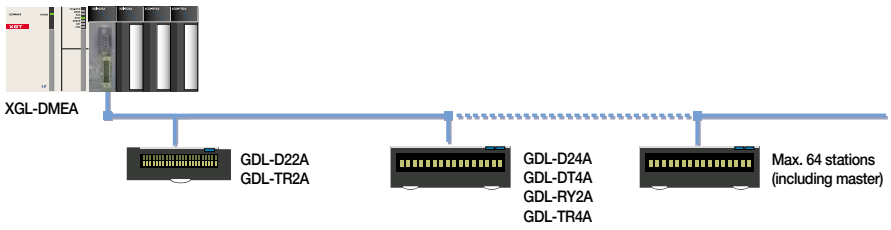
Smart I/O MODBUS system



Smart I/O Profibus-DP system



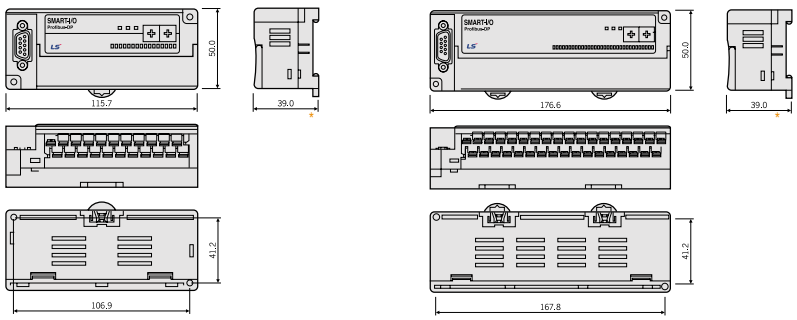
Smart I/O DeviceNet system



Note1) Segment: Communication section that does not use repeater or second master.

Dimensions

• 16points • 32points Unit: mm



* GxL-RY2 (16-point relay output) module follows the dimension of 32-point module.
* The length of C type Smart I/O is 47.5mm

Special

XGT series offer diverse special modules
such as analog, HSC, and positioning
to satisfy complicated industrial needs

Revolution of easy to use ···XGT Special module

Fast processing of parameter and data of special module

- Continually refreshing operation data of special module by CPU module
- Including contact points such as conversion data of AD/DA module and command of HSC & positioning module

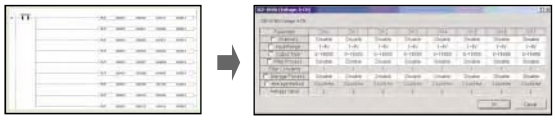
Easy- to-use (Easy operation parameter setting and data monitoring)

- Convenient parameter setting available through XG5000
- Providing useful functions that can monitor and test operation data and contact points through XG5000

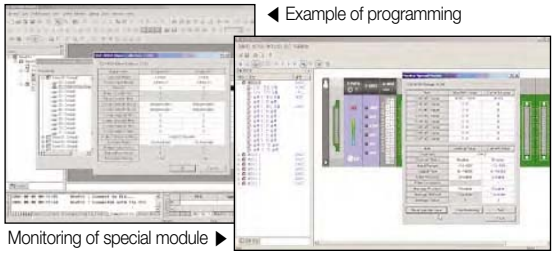
Simple maintenance (Changing online module)

- Without turning off and holding CPU, users can change special module with ease.

Before



◀ Example of programming



Monitoring of special module ▶

Analog input module

XGF-AV8A	8 channels, voltage input
XGF-AC8A	8 channels, current input
XGF-AD4S	4 channels, voltage/current input
XGF-AD8A	8 channels, voltage/current
XGF-AD16A	16 channels, voltage/current input

Analog output module

XGF-DV4A	4 channels, voltage output
XGF-DV4S	4 channels, voltage output,insulation
XGF-DC4A	4 channels, current output
XGF-DC4S	4 channels, current output, insulation
XGF-DV8A	8 channels, voltage output
XGF-DC8A	8 channels, current output

Temperature input module

XGF-TC4S	4 channels, thermocouple input, Insulation
XGF-RD4A	4 channels, RTD input
XGF-RD4S	4 channels, RTD input, Insulation

High-speed counter module

XGF-HO2A	2 channels, Open collector
XGF-HD2A	2 channels, Line driver

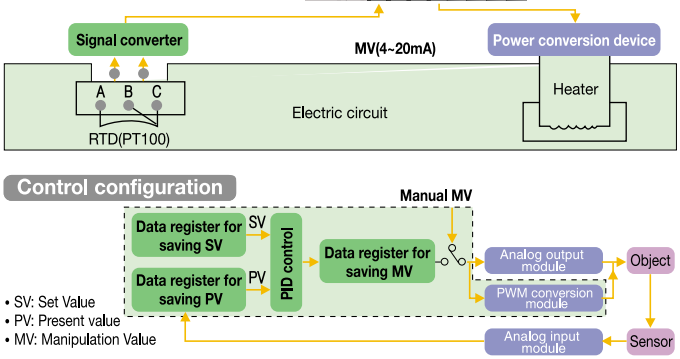
Positioning module

XGF-PO(1/2/3)A	1/2/3-axis, Open collector
XGF-PD(1/2/3)A	1/2/3-axis, Line Driver

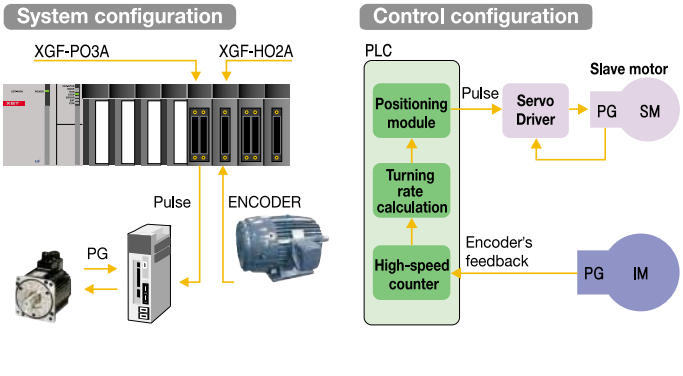
Temperature controller

XGF-TC4UD	4 channels input: voltage/current/TC/RTD 8 channels output: current/TR

Example: PID control



Application example: Synchronous operation of inductive motor and servo motor



Special

Special module / Analog input module

Features

- Fast conversion processing
- High resolution
- Setting and monitoring the special module parameter through XG5000
- Supporting 4 types of digital output data format

Specifications

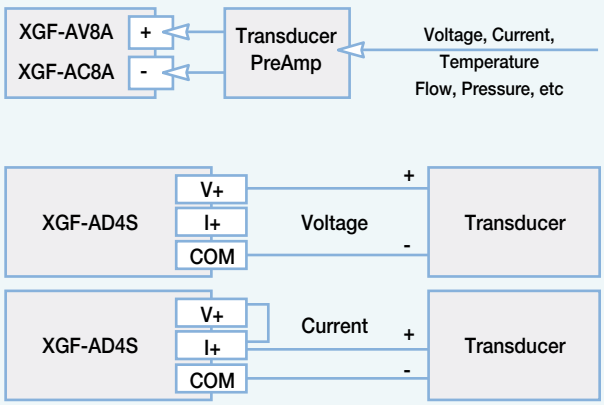
Item	XGF-AV8A (Voltage input)	XGF-AC8A (Current input)	XGF-AD4S (Voltage/Current input)
No. of input channel	8 channels		4 channels
Analog input	DC 1~5V, 0~5V, 0~10V, -10~10V	DC 4~20mA, 0~20mA	DC 1~5V, 0~5V, 0~10V, -10~10V DC 4~20mA, 0~20mA
	Selection of input range in program or S/W package (Available to be set per channel)		

Digital output

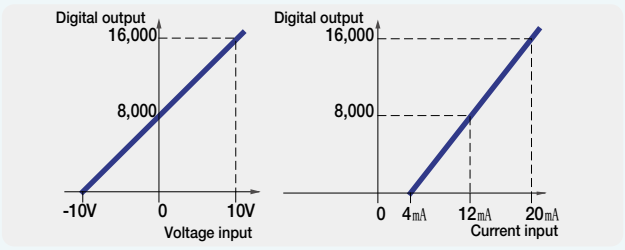
XGF-AV8A	Analog input		1~5V	0~5V	0~10V	-10~10V		
	Digital output	Unsigned value	0~16,000					
		Signed value	-8000~8,000					
		Precise value	1,000~5,000	0~5,000	0~10,000	-10,000~10,000		
		Percentile value	0~10,000					
XGF-AC8A	Analog input		4~20mA		0~20mA			
	Digital output	Unsigned value	0~16,000					
		Signed value	-8,000~8,000					
		Precise value	4,000~20,000		0~20,000			
		Percentile value	0~10,000					
XGF-AD4S	Analog input		1~5V	0~5V	0~10V	-10~10V	4~20mA	0~20mA
	Digital output	Signed value	-32,000~32,000					
		Precise value	1,000~5,000	0~5,000	0~10,000	-10,000~10,000	4,000~20,000	0~20,000
		Percentile value	0~10,000					

Resolution								
	1/16,000				1/64,000			
	1~5V	0.250mV	4~20mA	1.0μA	1 ~ 5V	62.5μV	4~20mA	250nA
	0~5V	0.3125mV			0~5V	78.1μV		
	0~10V	0.625mV	0~20mA	1.25μA	0 ~ 10V	156.3μV	0~20mA	312.5nA
	-10V~10V	1.250mV			±10V	312.5μV		
Accuracy	±0.2% or less (Ambient temperature 25°C) ±0.3% or less (Range of operation temperature)				±0.05% or less (Ambient temperature 25°C) Temp. coefficient ±16.7ppm/°C(Range of operation temperature)			
Conversion speed	250μs/channel							
Max. absolute input	15V		±30mA		Voltage: ±15V, Current: ±30mA			
Insulation method	Photo-coupler Insulation between input terminal and power supply							
	No insulation between channels				Insulation between channels			
Connection terminal	18 points							
No. of occupied I/O points	Fixed type (Setting in basic parameter): 64 points Variable type (Dissolving in basic parameter): 16 points							
Current consumption	420mA				610mA			
Weight (Kg)	0.14							

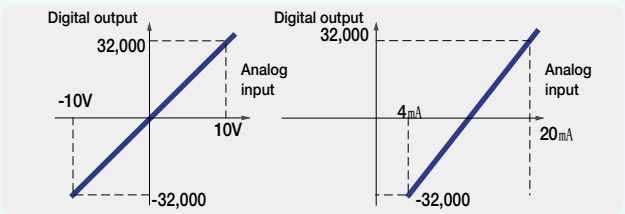
Configuration



A/D conversion characteristics



Insulation type



Special

Special module / Analog input module

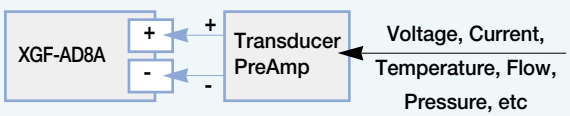
Features

- Fast conversion processing
- High resolution
- Setting and monitoring the special module parameter through XG5000
- Supporting 4 types of digital output data format

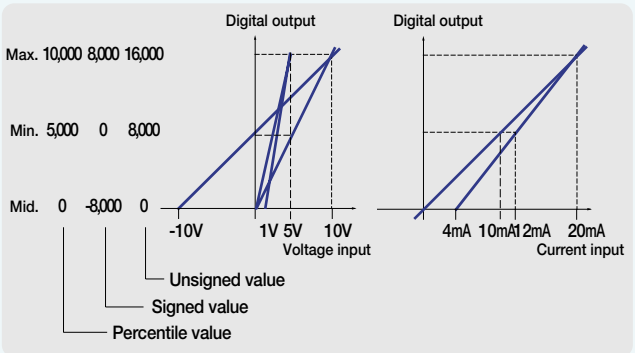
Specifications

Item		XGF-AD16A				XGF-AD8A	
No. of input channel		16 channels				8 channels	
Analog input	Voltage input	DC 1~5V, DC 0~5V, DC 0~10V, DC -10~10V (Input resistance: 1㏁)					
	Current input	DC4~20㎃, DC 0~20㎃ (Input resistance: 250Ω)					
	Input selection	Dip switch					
	Range selection	Selection of input range in the program or S/W package (Available to set per each channel)					
Digital output	Input type	Voltage input				Current input	
		DC 1~5V	DC 0~5V	DC 0~10V	DC -10~10V	DC 4~20㎃	DC 0~20㎃
	Unsigned value	0~16,000					
	Signed value	-8,000~8,000					
	Precise value	0~10,000					
	Percentile value	1,000~5,000	0~5,000	0~10,000	-10,000~10,000	4,000~20,000	0~20,000
	Resolution(1/16000)	0.2500mV	0.3215mV	0.6250mV	1.250mV	1.00㎂	1.25㎂
	Range selection	Selection of input type by program or parameter (Available to be set per each channel)					
Resolution		±0.2% or less (Ambient temperature 25℃), ±0.3% or less (Range of operation temperature)					
Max. absolute input		±15V				±30㎃	
Conversion speed		500㎲/channels				250㎲/channels	
Insulation method		Photo-coupler insulation between terminal and power supply					
Terminal		32 points				18 points	
No. of occupied I/O points (XGK)		Fixed type (Setting in basic parameter): 64 points				Variable type (Dissolving in basic parameter): 16 points	
Current consumption		DC 5V : 420㎃					
Wight		140g					

Configuration



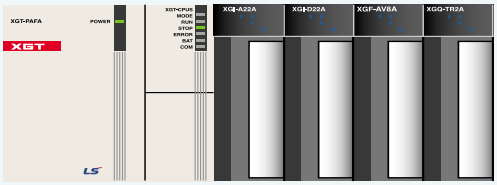
A/D conversion characteristics



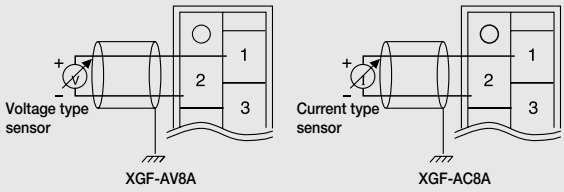
Special module / Analog input module (Example)

This is a simple example to start Analog input module setting. For more details, refer to user's manual.

System configuration

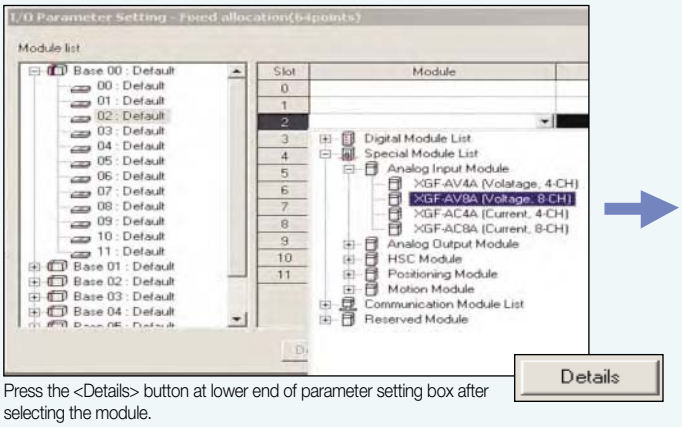


Wiring

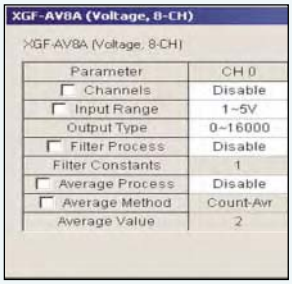


Parameter setting

In the parameter setting box, select slot and analog module that you want to use.
(This example shows to select '0' channel of voltage input type.)



Press the <Details> button at lower end of parameter setting box after selecting the module.



You need to fill out each item suitable for your system.

Programming

Create a program for A/D conversion (0~10V to 0~16,000).

Special devices for programming

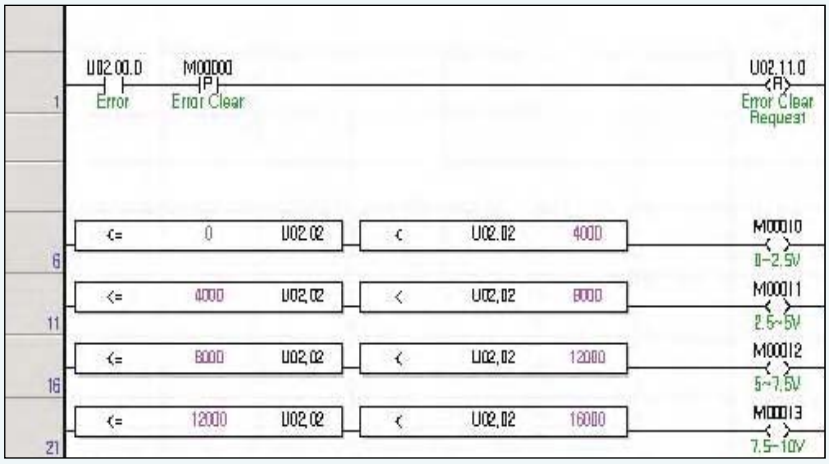
Refer to user' s manual for more details.

U02.0.0: Error

U02.11.0: Requesting error-clear

U02.02: Memory of channel A/D value

Uxy.aa.bb
x: Base number
y: Slot number
aa,bb: Refer to user's manual.



Special module / Analog output module

Features

- Fast conversion processing
- High resolution
- Setting and monitoring the special module parameter through XG5000
- Supporting 4 types of digital input data format

Specifications

Item	XGF-DV4A,XGF-DV8A, XGF-DV4S (Voltage output type)	XGF-DC4A,XGF-DC8A, XGF-DC4S (Current output type)
No. of output channel	XGF-DV4A/4S, XGF-DC4A/4S : 4 channels / XGF-DV8A, XGF-DC8A : 8 channels	
Analog output range	DC 1~5V, 0~5V	DC 4~20mA
	DC 0~10V, -10~10V	DC 0~20mA
	Selection of input range in the program or S/W package (Available to set per each channel)	

Digital input range

Analog output	Voltage type		1~5V	0~5V	0~10V	-10~10V
	Digital input	Unsigned value	0~16,000			
		Signed value	-8,000~8,000			
		Precise value	1,000~5,000	0~5,000	0~10,000	-10,000~10,000
		Percentile value	0~10,000			
Analog output	Current type		4~20mA		0~20mA	
	Digital input	Unsigned value	0~16,000			
		Signed value	-8,000~8,000			
		Precise value	4,000~20,000		0~20,000	
		Percentile value	0~10,000			
16-bit binary value: selection of input type by program or parameter (Available to be set per each channel)						

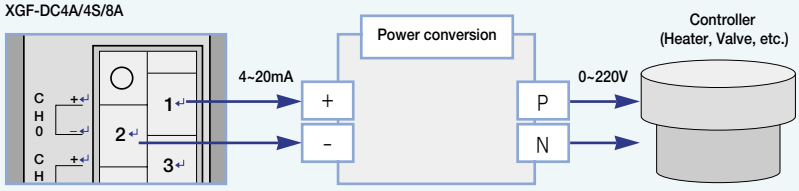
Max. resolution	1/16,000 (Per each input range)			
	1~5V	0.250mV	4~20mA	1.0μA
	0~5V	0.3125mV		
	0~10V	0.625mV	0~20mA	1.25μA
	±10V	1.250mV		
Accuracy	XGF-DV4A/8A, DC4A/8A : ±0.2% or less (Ambient temperature 25°C), ±0.3% or less (Range of operation temperature)			
	XGF-DV4S/DC4S : ±0.1% or less (Ambient temperature 25°C), temp coefficient: ±80ppm/°C			
Conversion speed	250μs/channel			
Max. absolute output	±15V		±24mA	
Insulation method	Photo-coupler insulation between terminal and power supply XGF-DV4A/8A, XGF-DC4A/8A: No insulation between channels XGF-DV4S, XGF-DC4S (Insulation type): Insulation between channels			
Connection terminal	18 point terminal			
No. of occupied points	Fixed type (Setting in basic parameter): assign 64 points			
	Variable type (Dissolving in basic parameter): assign 16 points			

Current consumption (mA)	DV4A	DV8A	DV4S	DC4A	DC8A	DC4S
Internal	190	190	200	190	190	200
External	140	180	150	210	300	220

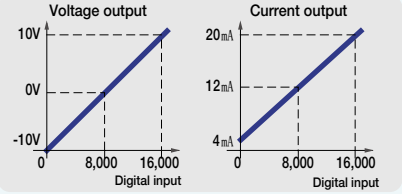
Weight (Kg)	0.15

Output wiring

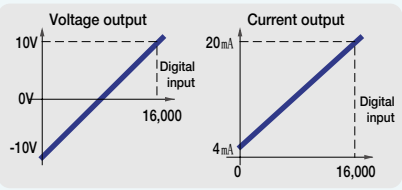
XGF-DV4A/4S/8A
XGF-DC4A/4S/8A



I/O conversion characteristics



Insulation type

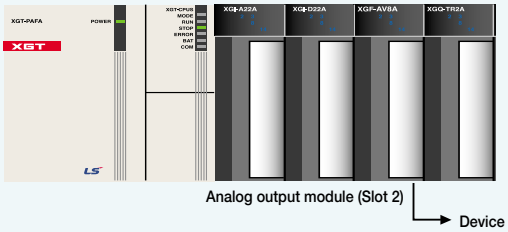


Special

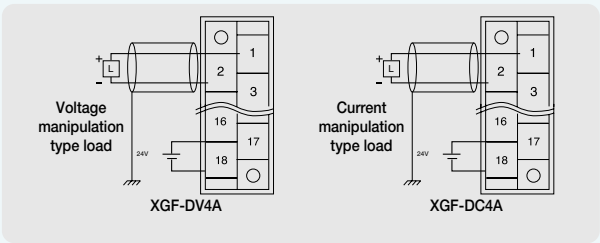
Special module / Analog output module (Example)

This is a simple example to start Analog output module setting. For more details, refer to user's manual.

System configuration

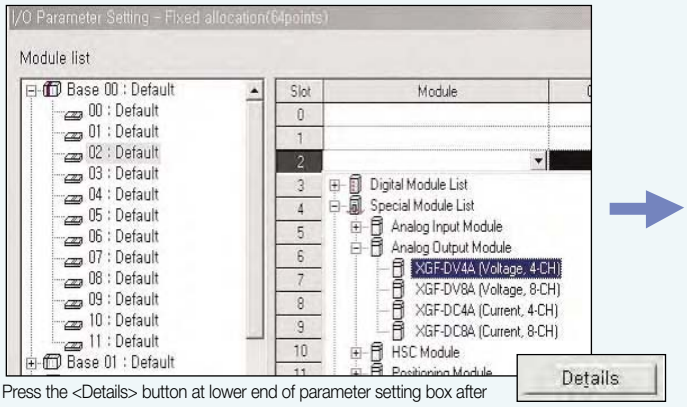


Wiring

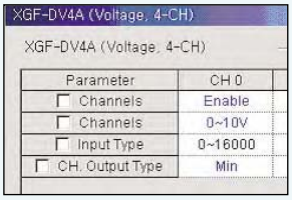


Parameter setting

In the parameter setting box, select slot and analog module that you want to use. (This example shows to select '0' channel of voltage output type.)



Press the <Details> button at lower end of parameter setting box after selecting the module.



You need to fill out each item suitable for your system.

Programming

Create a program for D/A conversion (0~16000 to 0~10V).

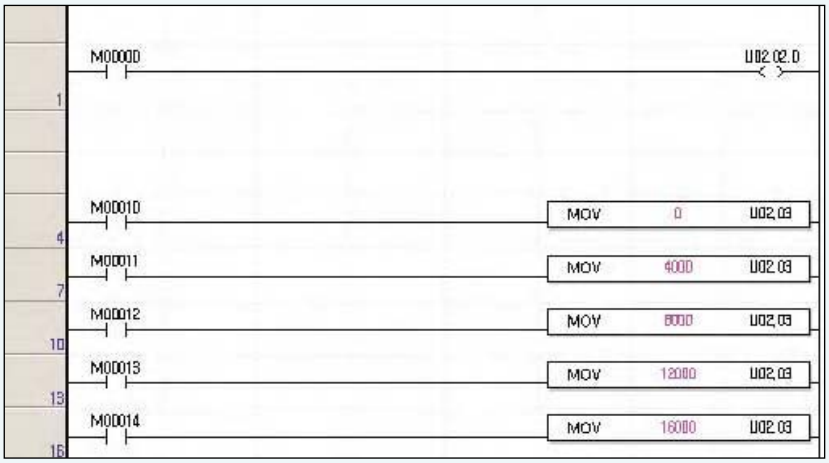
Special devices for programming

Refer to user' s manual for more details.

U02.02.0: Admitting Channel 0 output

U02.03: Output data of channel 0

Uxy.aa.bb
x: Base number
y: Slot number
aa,bb: Refer to user' s manual.



Special

Special module / High-speed counter module

Features

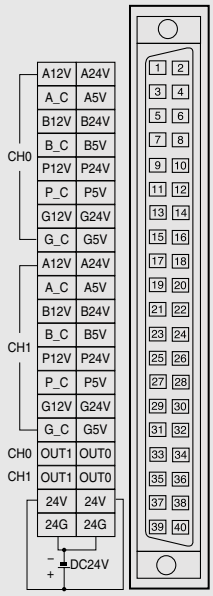
- Parameter setting and monitoring using XG5000
- Incremental encoder available
- Supporting various pulse input (5V, 12V, 24V)
- Various multiplication (1/2 phase pulse input)
- External present input
- Providing function to prevent from counting external signal
- Supporting HTL-level incremental encoder in the line-drive input type

Specifications

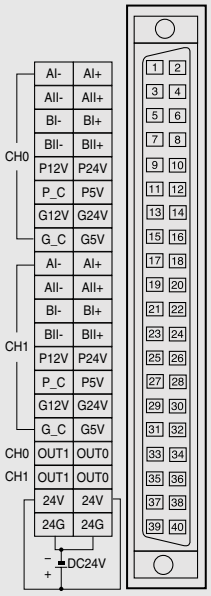
Item			Specification			
			XGF-HO2A			XGF-HD2A
No. of command	Signal		A Phase, B Phase			
	Input type		Voltage input (Open Collector)			Differential input (Line Driver)
	Signal level		DC 5/12/24V			RS-422 Line Drive/HTL LEVEL Line Drive
	Input voltage		24V DC (17.0V ~ 26.4V)	12V DC (9.8V ~ 13.2V)	5V DC (4.5V ~ 5.5V)	Line Driver
	Input current		7~11mA	7~11mA	7~11mA	RS-422 Line Drive HTL Level Line Drive
	Min. On guaranteed voltage		17.0V	9.8V	4.5V	
	Max. Off guaranteed voltage		4.5V	3.0V	1.7V	
	Counter enable		Set by program (Count only in 'Enable')			
Max. counting speed			200Kpps			500Kpps (HTL input: 250Kpps)
No. of channels			2 channels			
Counting range			Signed 32 Bit (-2,147,483,647 ~ 2,147,483,647)			
Counting type (Program setting)			Linear count (Generating Carry/Borrow when exceeding counting range, Max/Min value)			
Input mode (Program setting)			1 Phase input			
			2 Phase input			
			CW/CCW input			
Signal type			Voltage			
Up/Down counter setting	1-phase input		Program or B-phase			
	2-phase input		Phase difference			
	CW/CCW		A-phase input: Up count B-phase input: Down count			
Multiplication	1-phase input		1/2 multiplication (Programming)			
	2-phase input		1/2/4 multiplication (Programming)			
	CW/CCW		1 multiplication			
Control input	Signal		Preset signal, Signal to admit additional signal (Setting by terminal block or programming)			
	Signal level		DC 5V/12V/24V input type (Selecting terminal)			
	Signal type		Voltage			
External output	No. of output point		2 points/channel: Terminal output available			
	Type		Single comparison (>,>=,=,=<,<) or section comparison			
	Output type		Open Collector (Sink)			
Operating status display	Input signal		A-phase, B-phase, Preset signal, Signal to admit additional signal			
	Output signal		OUT1, OUT2			
	Operation status		Module Ready, Pulse input status of A, B phase			
Addition functions (Program setting)			· Count clear, Count latch · Pulse frequency count (Each input channel) · Section count (Set time value:1~60000ms) · Measuring counting number per a unit time (Set time value:1~60000ms) · Preventing from counting (Setting by internal/external input during counting)			
No. of occupied I/O points			Fixed type (Setting in basic parameter): 64 points Variable type (Dissolving in basic parameter): 16 points			
Terminal block			40-pin connector			
Current consumption			270			330
Weight (Kg)			0.09			

Terminal block configuration

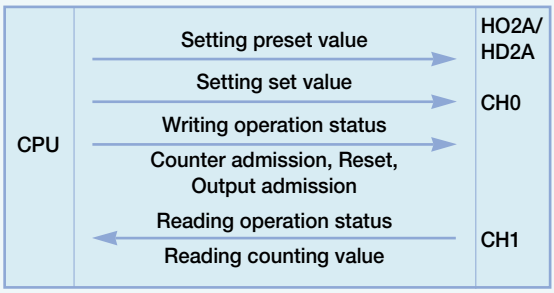
XGF-HO2A

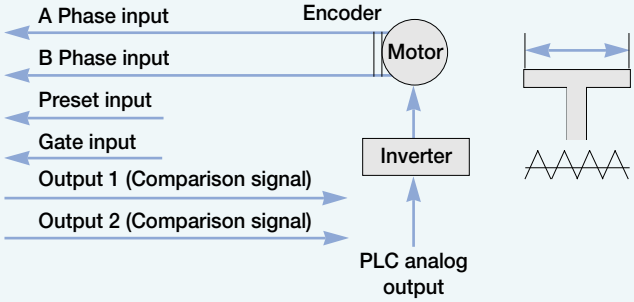
Pin layout	Pin number CH0	Pin number CH1	Signal name	
	1	17	A12V	A phase DC12V input
	2	18	A24V	A phase DC24V input
	3	19	A_C	A phase COM
	4	20	A5V	A phase DC5V input
	5	21	B12V	B phase DC12V input
	6	22	B24V	B phase DC24V input
	7	23	B_C	B phase COM
	8	24	B5V	B phase DC5V input
	9	25	P12V	Preset DC12V input
	10	26	P24V	Preset DC24V input
	11	27	P_C	Preset COM
	12	28	P5V	Preset DC5V input
	13	29	G12V	Gate DC12V input
	14	30	G24V	Gate DC24V input
	15	31	G_C	Gate COM
	16	32	G5V	Gate DC5V input
	33	35	OUT1	Comparison output OUT1
	34	36	OUT0	Comparison output OUT0
	37	38	24V	External power supply
	39	40	24G	DC24V

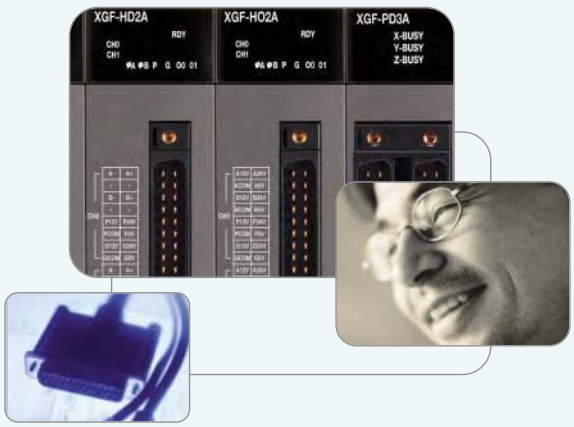
XGF-HD2A

Pin layout	Pin number CH0	Pin number CH1	Signal name	
	1	17	AI-	AI-Input (LINE DRIVE TTL LEVEL Input)
	2	18	AI+	AI+Input (LINE DRIVE TTL LEVEL Input)
	3	19	AII-	AII-Input (LINE DRIVE HTL LEVEL Input)
	4	20	AII+	AII+Input (LINE DRIVE HTL LEVEL Input)
	5	21	BI-	BI- Input (LINE DRIVE TTL LEVEL Input)
	6	22	BI+	BI+Input (LINE DRIVE TTL LEVEL Input)
	7	23	BII-	BII-Input (LINE DRIVE HTL LEVEL Input)
	8	24	BII+	BII+Input (LINE DRIVE HTL LEVEL Input)
	9	25	P12V	Preset DC12V input
	10	26	P24V	Preset DC24V input
	11	27	P_C	Preset COM
	12	28	P5V	Preset DC5V input
	13	29	G12V	Gate DC12V input
	14	30	G24V	Gate DC24V input
	15	31	G_C	Gate COM
	16	32	G5V	Gate DC5V input
	33	35	OUT1	Comparison output OUT1
	34	36	OUT0	Comparison output OUT0
	37	38	24V	External power supply
	39	40	24G	DC24V

Configuration





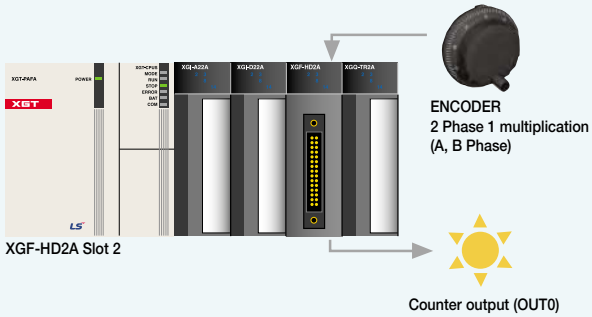


Special

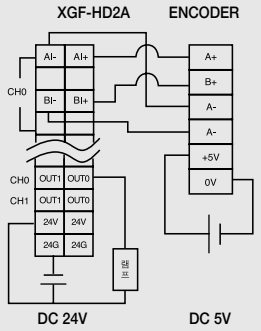
Special module / High-speed counter module (Example)

This is a simple example of high-speed counter module setting.
For more details, refer to user's manual.

System configuration



Wiring



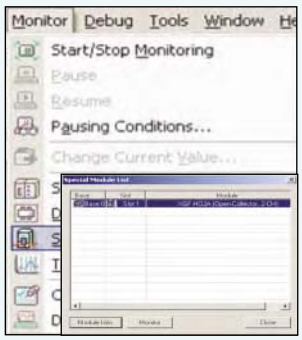
* This is wiring diagram of line driver. For open collector or other control, refer to user' s manual.

Control configuration

- Light a lamp of output when present value reaches 1000 of pulse input counted by encoder.
- Current value of pulse is saved in D100~D101 and is monitored.

Module test (Online)

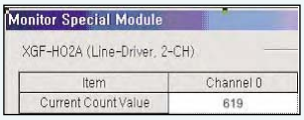
- Module test function of XGT enables to monitor operation status of high-speed counter module and to test-run.



Select [Monitor] → [Special Module Monitoring] in menu and appoint high-speed counter.

After pressing the button for [Start Monitoring], press the button [FLAG monitor].

Change [Counter Enable] status to ON.

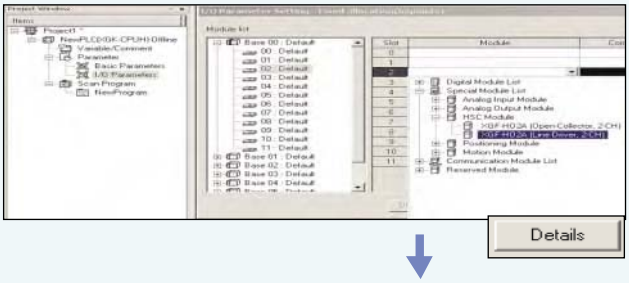


Check current counting value in 'Monitor Special Module' screen box.

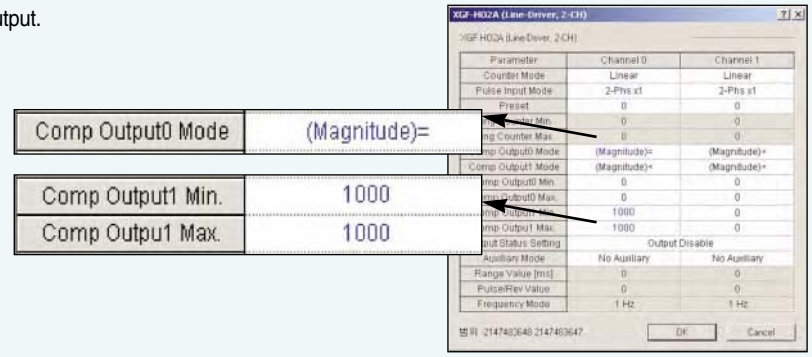
Parameter setting

• In I/O parameter setting box, select slot and analog module that you want to use.
(This example shows to select 2-channel line driver.)

Press the <Details> button at lower end of parameter setting box after selecting the module.



Input 1000 as Max. and Min. comparison output.



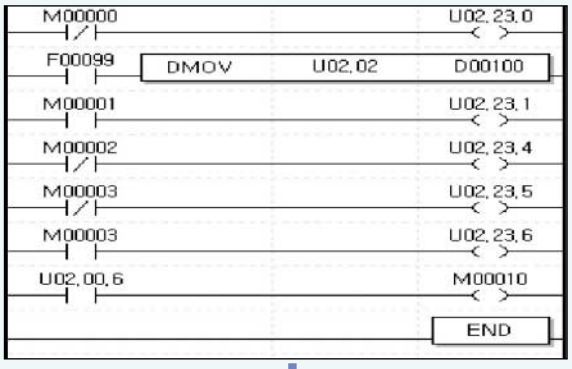
Programming

• After completing programming like following figure, download it to PLC and check operation status.

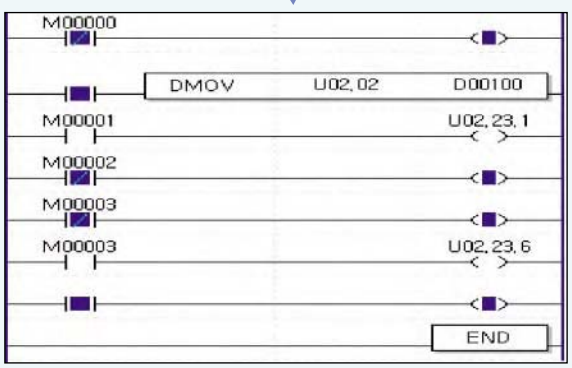
Special devices for programming

Refer to user's manual for more details.
U02.23.0: Count operation admission
U02.23.1: Count preset
U02.23.4: Consistent output admission
U02.23.5: Output external terminal admission
U02.23.6: OUT0 consistent signal reset
U02.00.6: Contact for checking external output (Practically effective output is outputted through OUT0 terminal)
U02.02~U02.03: Counter present value

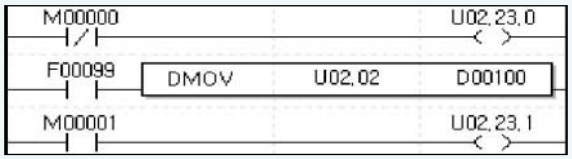
Uxy.aa.bb
x: Base number
y: Slot number
aa,bb: Refer to user's manual



After downloading, monitor operation status.



For monitoring just present value, follow the example.



Special

Special module / Positioning module [APM]

Features

- Highly reliable position control with LSIS ASIC-embedded processor
- Enhanced control with fast control processing speed
- High-speed motor control (Max. pulse output: 1Mbps)
- Circular/linear interpolation, separate/synchronous operation
- Trapezoidal & S-curve acceleration/deceleration
- Easy and quick control through external input (JOG operation included)
- Encoder input support
- High-speed processing of command (4ms)
- Easy to set positioning parameters (Windows)
- Monitoring/Tracking/Simulation
- Available to edit operation parameter data in EXCEL
- Self-diagnosis
- Real-time information and solution for each error

Specifications

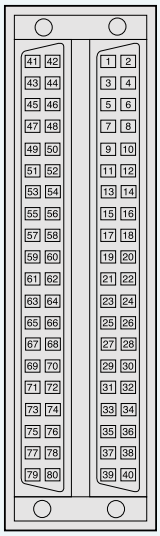
Item			Specifications		
			XGF-PO1A, XGF-PD1A	XGF-PO2A, XGF-PD2A	XGF-PO3A, XGF-PD3A
Number of axis			1	2	3
Interpolation				2-axis linear interpolation, 2-axis circular interpolation	2/3-axis linear interpolation, 2-axis circular interpolation
Control method			Position control, speed control, speed/position control, position/speed control		
Setting unit			Pulse, mm, inch, degree		
Positioning data			Each axis has 400 data items (Operation step number 1~400). It is available to set with software package or programming.		
Software package			Available (Connected with RS-232C Port of CPU module)		
Data backup			Flash memory (No battery)		
Positioning	Positioning method		Absolute / relative method		
	Position address range	mm	-214748364.8 ~ 214748364.7 (㎛)		
		Inch	-21474.83648 ~ 21474.83647		
		Degree	-21474.83648 ~ 21474.83647		
		Pulse	-2147483648 ~ 2147483647		
	Type		XGF-PO□A: Open collector, XGF-PD□A: Line Driver		
	Position speed range	mm	0.01 ~ 20000000.00 (㎜/min)		
		Inch	0.001 ~ 2000000.000 (inch/min)		
		Degree	0.001 ~ 2000000.000 (degree/min)		
		Pulse	XGF-PO□A: 1~200,000 (pulse/sec), XGF-PD□A: 1~1,000,000 (pulse/sec)		
	Accel/Decel pattern		Trapezoidal & S-curve acceleration/deceleration		
	Accel/Decel time		1 ~ 65,535㎳		
Max. output pulse			XGF-PO□A: 200Kpps / XGF-PD□A: 1Mpps		
Max. distance			XGF-PO□A: 2m / XGF-PD□A: 10m		
Max. encoder input			200 Kpps		
Error display			LED		
Operation display			LED		
Connection connector			40 Pin connector		
Size of cable			AWG #24		
Occupied points of I/O			64 points (Fixed type), 16 points (Variable type)		
Current consumption (mA)			XGF-PO1A: 340	XGF-PO2A: 360	XGF-PO3A: 400
			XGF-PD1A: 510	XGF-PD2A: 790	XGF-PD3A: 860
Weight (kg)			0.12	0.13	0.135

※ XGF-PO□O: Open Collector type, □: Number of axis
XGF-PD□D: Line Drive type, □: Number of axis

Terminal block configuration

Pin layout

1 axis



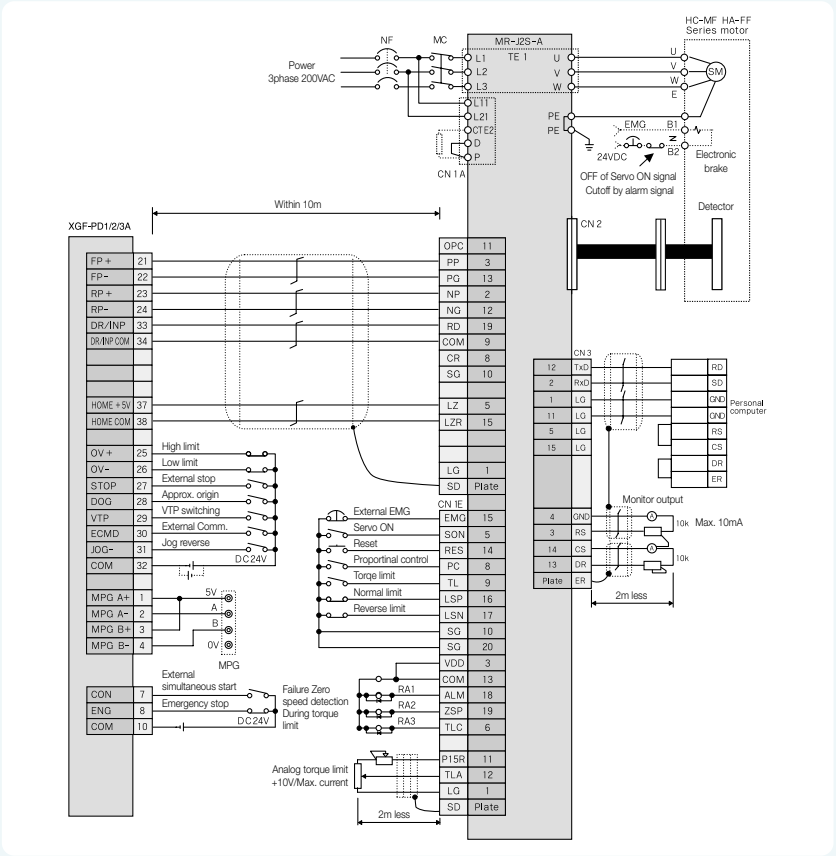
2/3 axes

For	Pin number X	Pin number Y	Pin number Z	Signal name		Signal direction APM - Ext. device	Condition
Axis	21	41	61	FP+	Pulse output (Differential +)	→	
	22	42	62	FP-	Pulse output (Differential -)	→	
	23	43	63	RP+	Pulse sign (Differential +)	→	
	24	44	64	RP-	Pulse sign (Differential -)	→	
	25	45	65	OV+ *	High limit	←	
	26	46	66	OV- *	Low limit	←	
	27	47	67	STOP	External stop signal	←	
	28	48	68	DOG	Approximate origin	←	
	29	49	69	VTP	Speed/Position switching signal	←	
	30	50	70	ECMD	External command signal	Start	←
						Skip	←
						JOG+ (Forward)	←
	31	51	71	JOG-	JOG reverse operation	←	
	32	52	72	COM	Common (OV+, OV-, STOP, DOG, VTP, ECMD, JOG-)	⇔	
	33	53	73	DR/INP	Imposition/Driver Ready signal	←	
	34	54	74	DR/INP COM	Imposition/Driver Ready signal Common	⇔	
	35	55	75	HOME +24V	Zero signal (+24V)	←	
	36	56	76	NC	Not used		
	37	57	77	HOME +5V	Zero signal (+5V)	←	
	38	58	78	HOME COM	Zero signal (+24V, +5V) Common	⇔	
	39	59	79	24V	24V Power supply (Not used in case of line drive output)		
	40	60	80	P COM	External 24V GND (Not used in case of line drive output)		
Common	1			MPG A+	Manual pulse generator/Encoder A+ Input	←	
	2			MPG A-	Manual pulse generator/Encoder A- Input	←	
	3			MPG B+	Manual pulse generator/Encoder B+ Input	←	
	4			MPG B-	Manual pulse generator/Encoder B- Input	←	
	5			NC	Not used	←	
	6			NC	Not used	←	
	7			CON	External simultaneous start	←	
	8			EMG *	Emergency stop	←	
	9			NC	Not used		
	10			COM	(CON, EMG) Common	⇔	
	11~20			NC	Not used		

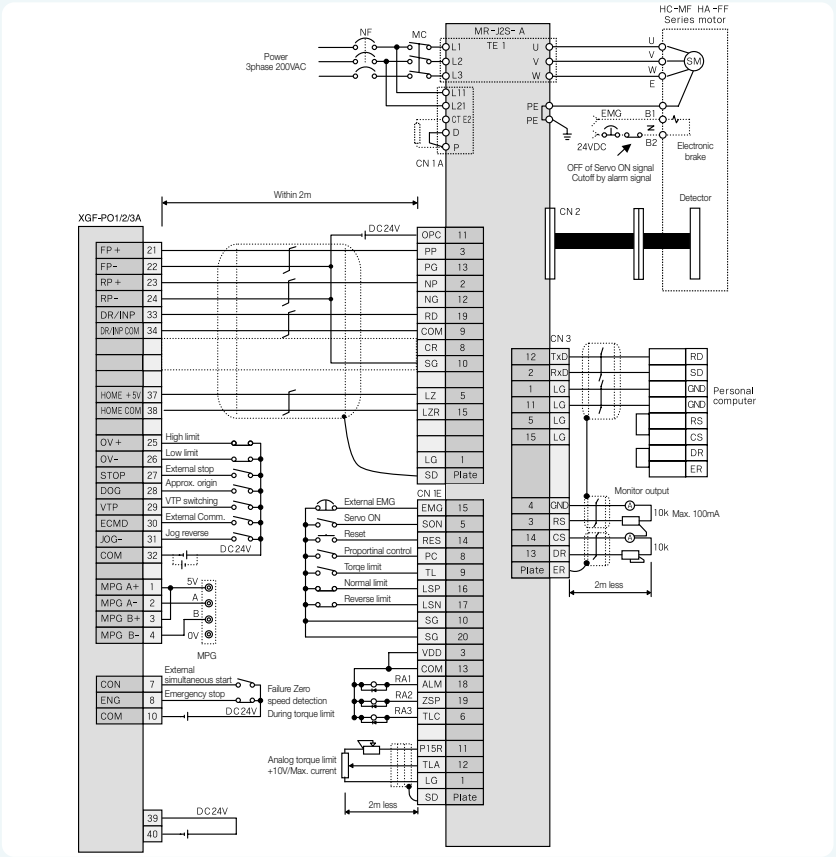
Special

Connection with MR-J2/J2S-□A

• XGF-PD1/2/3A (Line Driver)



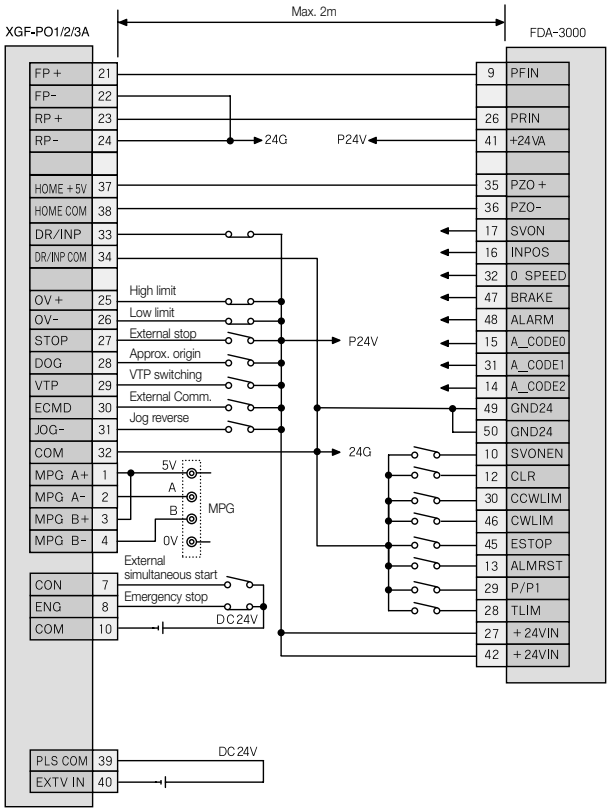
• XGF-PO1/2/3A (Open Collector)



Special

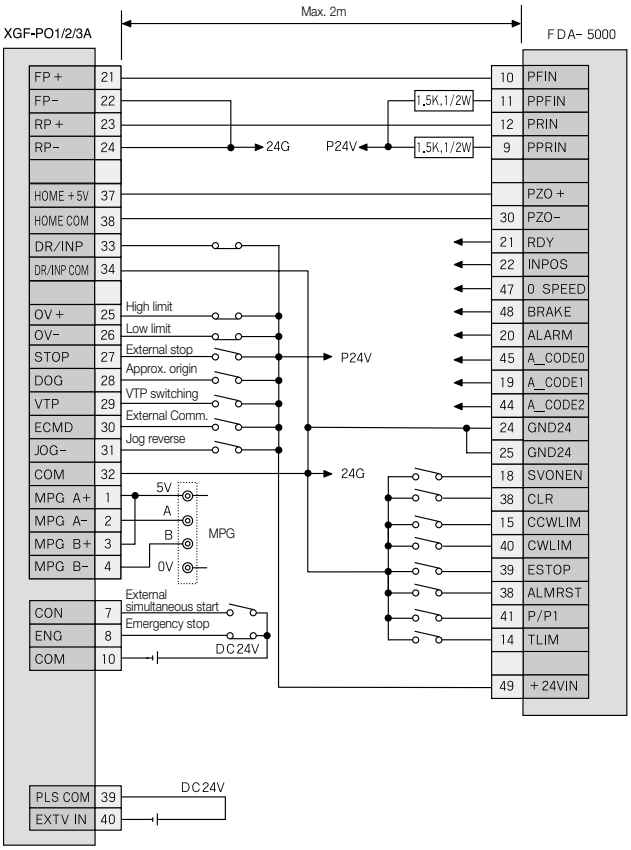
Connection with FDA-3000 AC Servo driver

• XGF-PO1/2/3A (Open Collector)

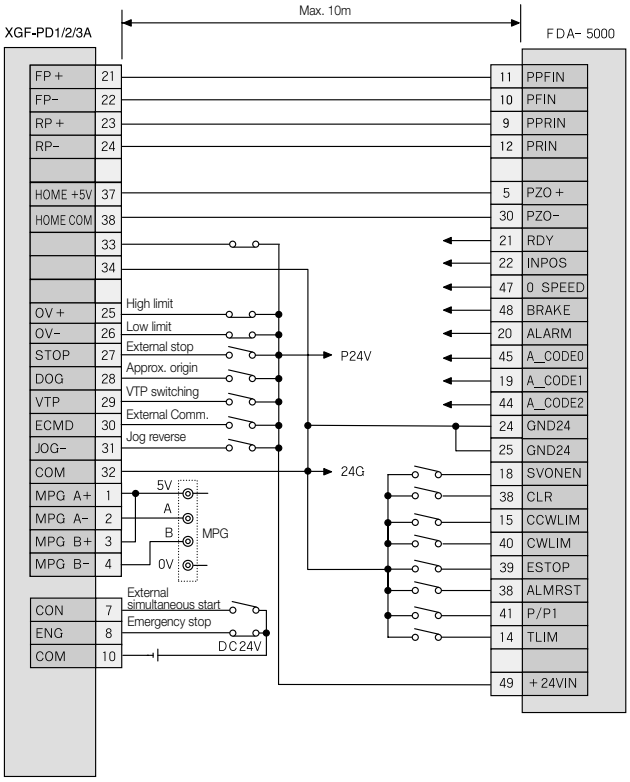


Connection with FDA-5000 AC Servo driver

• XGF-PO1/2/3A (Open Collector)



• XGF-PD1/2/3A (Line Driver)

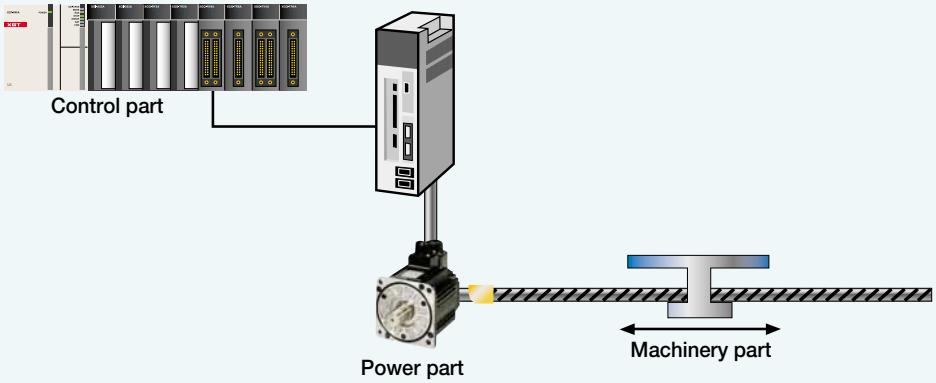


Special module / Positioning module (Example)

This is a simple example to control 1-axis servo motor.

System configuration

- Positioning system consists of control part, power part, and machinery part.
- Control part: Install APM module on base and complete parameter setting and programming.
- Power part: Power part generates momentum, and it consists of [servo-driver + servo-motor] and [step-driver + step-motor].
- Machinery part: Machinery part is to transport objects, and it can be ball screw, timing belt and rack gear.

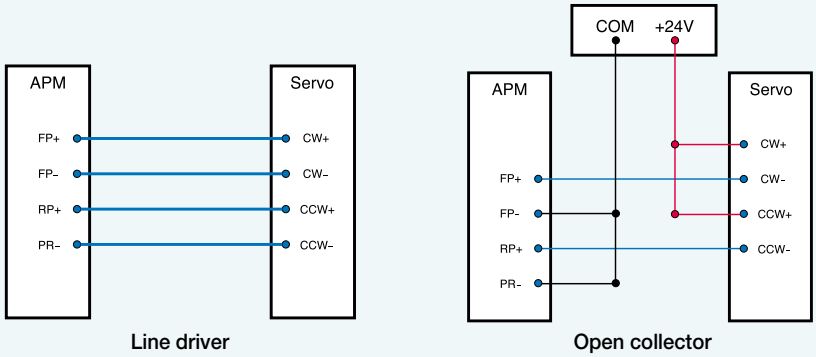


System design

- APM: Determine type and quantity considering the number of control axis and operation function.
- Driver: Select driver with identical output type of APM.
  (In case output type of APM is line driver, driver should support a pulse train input type of line driver.)
- Motor: Select capacity considering operation characteristics of load.
- Mechanical: Design precise mechanical system to minimize error.

Connection to drivers

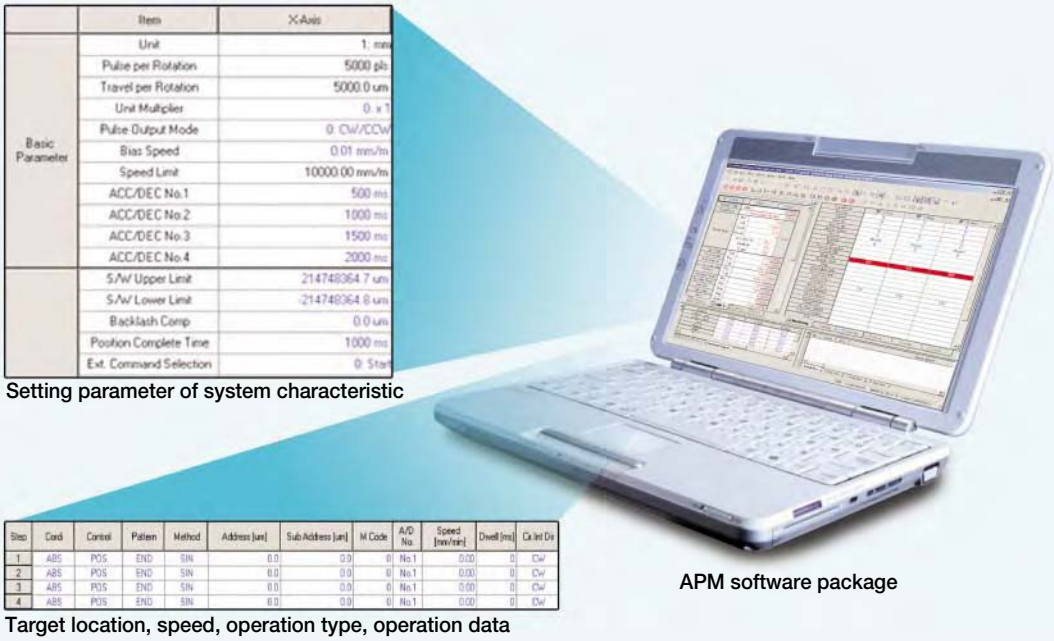
- The following picture is wiring pulse train signal between driver and APM for pulse train signal.
- Terminal besides pulse train signal is used additionally according to user-purpose, system characteristics.
- For wiring of optional terminal of Servo (Step) driver, refer to user' s manual.



Special module / Positioning module (Example)

Parameter, data setting and transmission

- Set system characteristic, target location, operation speed, and operation type using APM software package.
- Transmit operation parameter and data to APM.



	Item	X-Axis
Basic Parameter	Unit	1: mm
	Pulse per Rotation	5000 pls
	Travel per Rotation	5000.0 um
	Unit Multiplier	0: x1
	Pulse Output Mode	0: CW/CCW
	Bias Speed	0.01 mm/m
	Speed Limit	10000.00 mm/m
	ACC/DEC No.1	500 ms
	ACC/DEC No.2	1000 ms
	ACC/DEC No.3	1500 ms
	ACC/DEC No.4	2000 ms
	S/W Upper Limit	214748364.7 um
	S/W Lower Limit	-214748364.8 um
	Backlash Comp	0.0 um
	Position Complete Time	1000 ms
	Ext. Command Selection	0: Start

Setting parameter of system characteristic

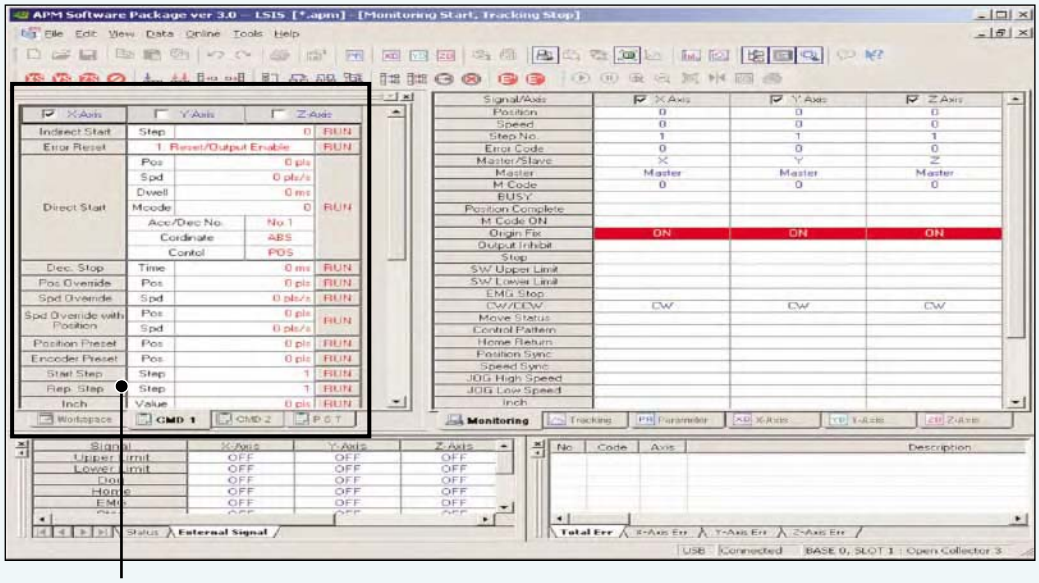
Step	Cord	Control	Pattern	Method	Address [um]	Sub Address [um]	M Code	A/D No.	Speed [mm/min]	Dwell [ms]	Co.Int Dir
1	ABS	POS	END	SIN	0.0	0.0	0	No.1	0.00	0	CW
2	ABS	POS	END	SIN	0.0	0.0	0	No.1	0.00	0	CW
3	ABS	POS	END	SIN	0.0	0.0	0	No.1	0.00	0	CW
4	ABS	POS	END	SIN	0.0	0.0	0	No.1	0.00	0	CW

Target location, speed, operation type, operation data

APM software package

Initial system inspection

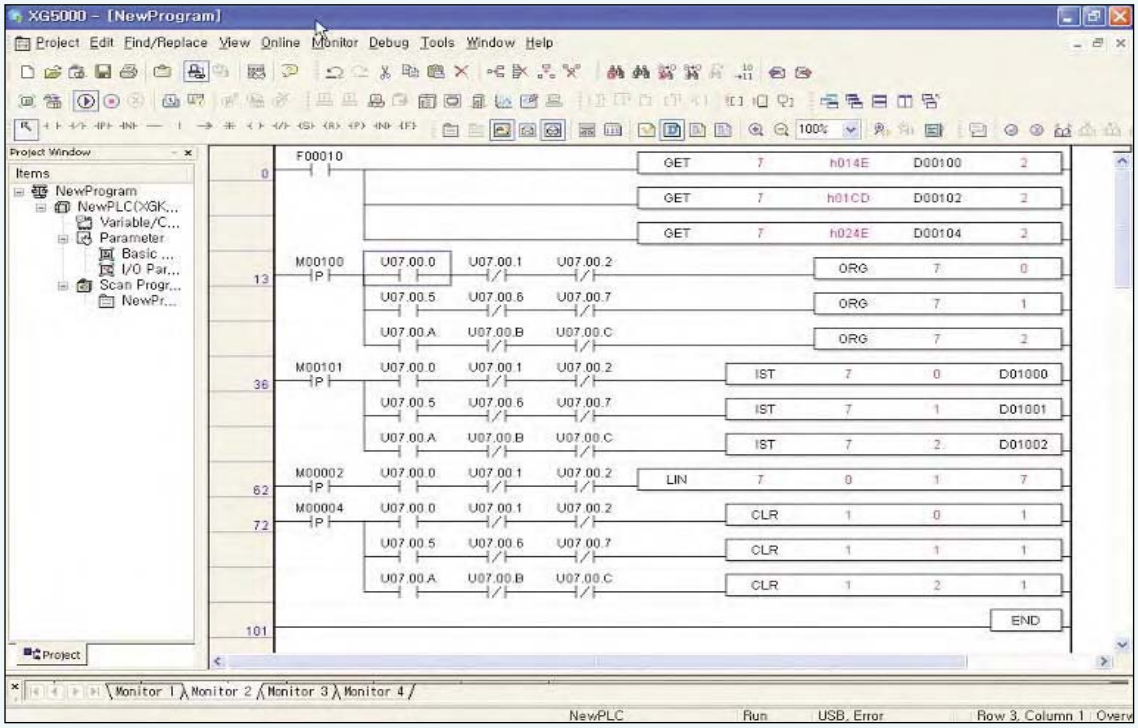
- Perform a trial-run using APM Software Package, and check external wiring, operation data setting, and status of machinery part. It is recommended to do trial-run before programming.
- If a program is saved in CPU and operation mode is 'RUN', a unexpected fault can occur due to disagreement between operation condition of operation control program and operation result of APM Software Package.



Operate APM without positioning programming

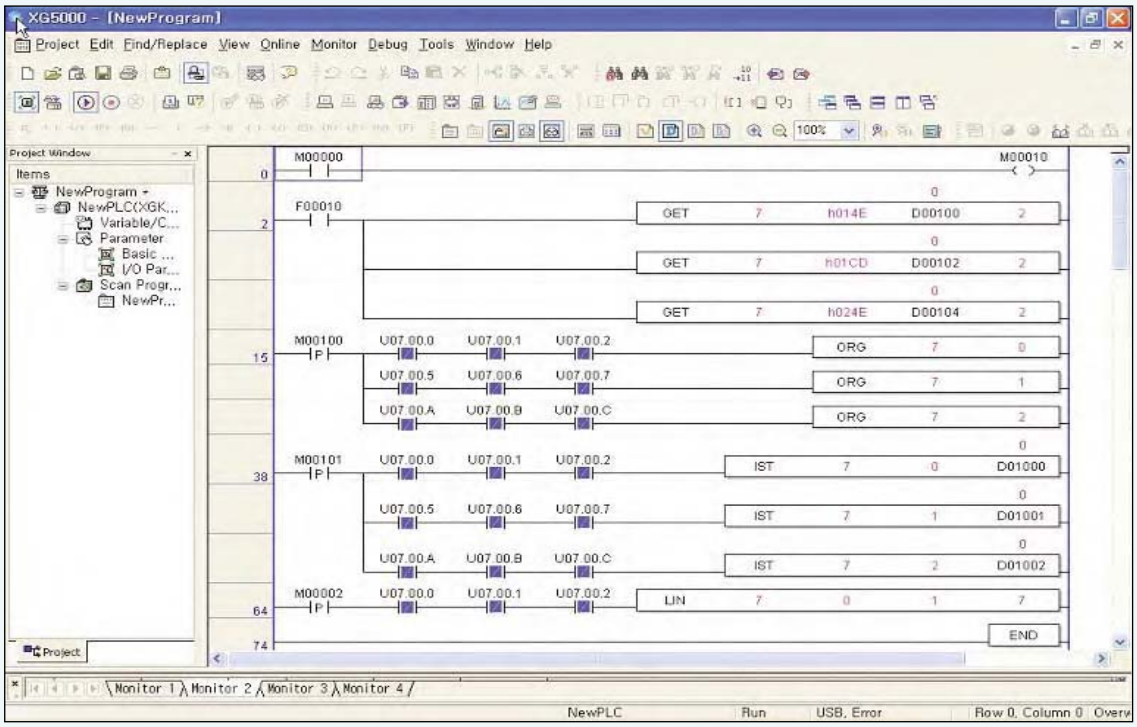
Programming

• Create a program using dedicated command for APM control.
ex) Origin point return-ORG, Independent operation-IST


XG5000 - [NewProgram]
Project Edit Find/Replace View Online Monitor Debug Tools Window Help
Project Window
Items
NewProgram
NewPLC(XGK...
Variable/C...
Parameter
Basic ...
I/O Par...
Scan Progr...
NewPr...
F00010
GET 7 h014E D00100 2
GET 7 h01CD D00102 2
GET 7 h024E D00104 2
M00100 U07.00.0 U07.00.1 U07.00.2 ORG 7 0
U07.00.5 U07.00.6 U07.00.7 ORG 7 1
U07.00.A U07.00.B U07.00.C ORG 7 2
M00101 U07.00.0 U07.00.1 U07.00.2 IST 7 0 D01000
U07.00.5 U07.00.6 U07.00.7 IST 7 1 D01001
U07.00.A U07.00.B U07.00.C IST 7 2 D01002
M00002 U07.00.0 U07.00.1 U07.00.2 LIN 7 0 1 7
M00004 U07.00.0 U07.00.1 U07.00.2 CLR 1 0 1
U07.00.5 U07.00.6 U07.00.7 CLR 1 1 1
U07.00.A U07.00.B U07.00.C CLR 1 2 1
END
Project
Monitor 1 Monitor 2 Monitor 3 Monitor 4
NewPLC Run USB, Error Row 3, Column 1

Program monitoring

• Monitor output condition following input condition and inspect operation status of APM and correct programming error.



Special

Special module / RTD input module

Features

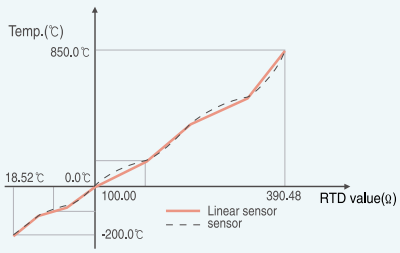
- Supports various additional functions (average, alarm, filter)
- Special module parameter setting and monitoring with XG5000
- Supports digital conversion, temperature display and user scaling

Specifications

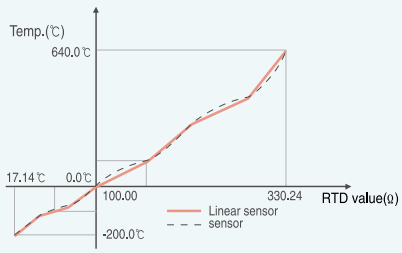
Item			XGF-RD4A	XGF-RD4S
No. of input channel			4 channels	4 channels
Input sensor type		Pt100	JIS C1604-1997	JIS C1604-1997
		JPt100	JIS C1604-1981, KS C1603-1991	JIS C1604-1981, KS C1603-1991
		PT1000	-	JIS C1604-1997
		NI100	-	DIN 43760-1987
Temperature input range		Pt100	-200.0 ~ 850.0°C	-200.0 ~ 850.0°C
		JPt100	-200.0 ~ 640.0°C	-200.0 ~ 640.0°C
		PT1000	-	-200.0 ~ 850.0°C
		NI100	-	-60.0 ~ 180.0°C
Digital output	Temperature display (unit: 0.1)	Pt100	-2,000 ~ 8,500	-2,000 ~ 8,500
		JPt100	-2,000 ~ 6,400	-2,000 ~ 6,400
		PT1000	-	-2,000 ~ 8,500
		NI100	-	-2,000 ~ 1,800
	Scaling display (Customize)		0 ~ 65535	
			-32768 ~ 32767	
Accuracy	Normal temp.(25°C)		±0.2%	±0.1%
	Full temp.(0~55°C)		±0.3%	±70ppm/ °C
Conversion speed			40ms / channel	
Insulation	Channel to Channel		Non-insulation	Insulation
	Terminal to PLC Power		Photo-coupler	
Wiring method			3-wire	4-wire
Function	Average		Time average (320~64000ms)	
			Counting average(2~64000 count)	
			Moving average(2~100 samples)	
	Alarm		Process alarm	
			Input changing rate alarm	
			Disconnection detection	
	Filtering		Digital filter (160~64000ms)	
Terminal block			18-point terminal block	
Current consumption			5V: 450mA	5V: 720mA
Weight [g]			150g	

Characteristics of temperature conversion

• Pt100 : JIS1604-1997

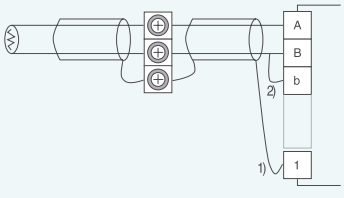


• jPt100 : JIS1604-1981, KS C1603-1991

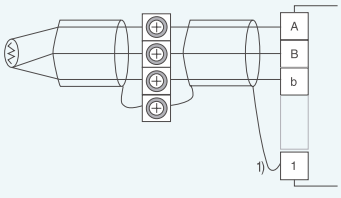


Wiring

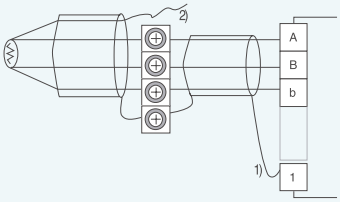
• Connection with 2-wire type sensor



• Connection with 3-wire type sensor



• Connection with 4-wire type sensor



1) When sensor and compensating wire are shielded, shield-connection to FG terminal of the module is available.

2) The wiring of 4-wire type sensor is identical with the wiring of 3-wire type sensor. 3 wires is connected to the module. But the other wire is not connected with the module.

Special module / Thermocouple module

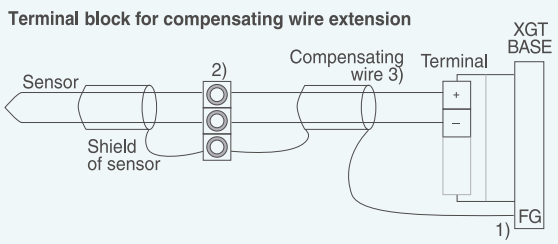
Features

- Insulation between channels
- ±0.1% (25℃) constant density
- Supports various input sensor (supporting C-type sensor)
- Various additional functions (average, filter, alarm, max/min value display)
- Special module parameter setting and monitoring with XG5000

Specifications

Item	XGF-TC4S	
Input channels	4 channels	
Input sensor type	K, J, E, T, B, R, S, N, C	JIS C1602-1995ITS-90
Input temperature range	K	-250 ~ 1350℃
	J	-200 ~ 1200℃
	E	-250 ~ 1000℃
	T	-250 ~ 400℃
	B	400 ~ 1800℃
	R	-50 ~ 1750℃
	S	-50 ~ 1750℃
	N	-270 ~1300℃
	C	0 ~ 2300℃
Digital output	Temperature display (unit: 0.1)	Display down to the first decimal place (0.1℃)
	Scaling	0 ~ 65535
	(User range setting)	-32768 ~ 32767
Accuracy	Normal temp. (25℃)	±0.1%
		Some section can permit 0.5%
	Temperature coefficient (Operating temp. range)	±100ppm℃
Conversion speed	40ms/ channel	
Insulation	Between channels	Insulation
	Between terminals and power	Insulation(Photo-Coupler)
Compensation	Automatic compensation by RJC sensing (PT100)	
	Compensation degree	±1.0%
Function	Average	Average time (320 ~ 6400ms)
		Average number (2~ 64000)
		Average move (2 ~100)
	Alarm	Process Alarm
		Change rate alarm
		Burn-out detection
	Filter	Digital filter (160 ~ 64000ms)
	Max./Min. values display	Max./Min. values display
Terminal block	18-point terminal block	
Current consumption	5V : 610mA	
Weight (kg)	0.150	

Input wiring

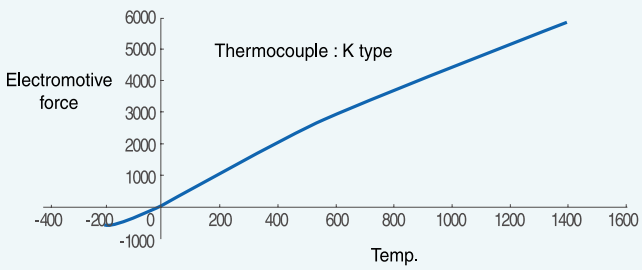


1) When sensor and compensating wire are shielded, shield connection to FG terminal is available.

2) To minimize an error, overall temperature of block terminal need to be equal.

3) Compensating sensor should be the same type of sensor which is used for measurement.

Characteristics of I/O conversion



Special

Special module / Temperature controller

Features

- Optimum temperature control
- Universal input: TC, RTD, Voltage, Current
- Isolated input
- Output: Current/Transistor
- Parameter setting via dedicated software: TG-CON
- Variety of control types
  - PID control
  - Cascade control
  - On/ Off control
- Disconnection detection
- Various input functions: Bias, Filter, Square root
- Auto-tuning

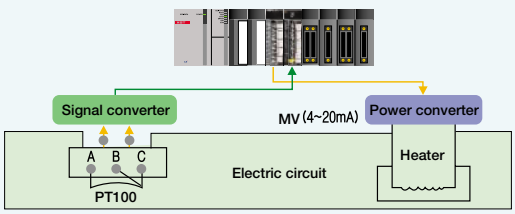
Specifications

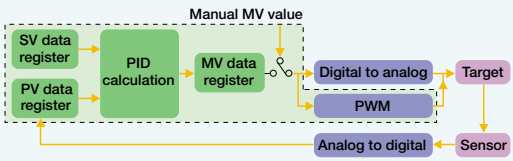
Item	XGF-TC4UD		
No. of loop	4 loops		
Input	Thermo couple	K	-200 ~ 1300℃
			0 ~ 500℃
		J	-200 ~ 1200℃
			0 ~ 500℃
		E	-200 ~ 1000℃
		T	-200 ~ 400℃
		B	400 ~ 1800℃
		R	0 ~ 1700℃
		S	0 ~ 1700℃
		N	-200 ~ 1300℃
		C(W5Re/W26Re)	0 ~ 2300℃
		PL II	0 ~ 1300℃
		L	-200 ~ 900℃
		U	-200 ~ 600℃
	RTD	Pt100	-200 ~ 850℃
		JPt100	-200 ~ 600℃
		Pt1000	-200 ~ 800℃
	Voltage	DC mV	0 ~ 10mV
			0 ~ 100mV
		DC V	0 ~ 1V
			1 ~ 5V
			0 ~ 5V
			0 ~ 10V
			-5V ~ 5V
			10V ~ 10V
	Current	DC mA	4 ~ 20mA
			0 ~ 20mA
	Input channel	4 channels (Input type selection per channel)	

Specifications

Item	XGF-TC4UD				
Resolution	Resolution Refer to the user's manual (Resolution for each input type)				
Cold junction compensation	Compensation		Automatic compensation by RJC sensor		
	Precision		±0.2℃		
Digital output	Temperature display		0.1℃/1℃ (Selection by software)		
	Linear display		0~1000		
	Scale display		Only for voltage/current input Range : -3,000~3,000 Setting range: 0~3000		
Control type	0.2sec/4 loops				
Conversion speed	PID, On/Off control				
Parameter	Set value (SV)		Selection per input type		
	Gain		0 : ON/OFF control, Real type		
	Integrated time		0 : No Differential control, Real type		
	Differential time		0 : No Integrated control, Real type		
Output	No. of output channel		8 channels (PWM or analog output)		
	PWM	Rated load voltage	DC 24V		
		Max. current point	0.1A points		
		On voltage drop	DC 0.3V or less		
		Off leakage current	0.1mA or less		
		Response time	ON ⇒ OFF	1ms or less	
			OFF ⇒ ON	1ms or less	
		Periodic	0.5~120.0sec (resolution: 0.5sec)		
		Time resolution	High value between 10ms or 0.5% of full scale		
	Analog output	Range	4~20mA		
		Resistance	600Ω or less		
		Resolution	±1.0%, 25℃		
		Precision	8㎂		
Insulation	Item		Insulation	Insulation withstand voltage	Insulation resistance
	Channel - Channel		Trans	500V AC, 50/60Hz 1min, Leakage 10mA or less	500V DC, 10MΩ or more
	Input terminal - PLC		Photocoupler		
	Current output - Current output		Non insulation		
	External power- Output				
Warm-up	20min or more				
Terminal	18 points terminal				
Power	5V, DC 24V (external)				
Current consumption	DC 5V : 900mA (Internal) DC 24V : 300mA (external)				

Example: Constant temperature



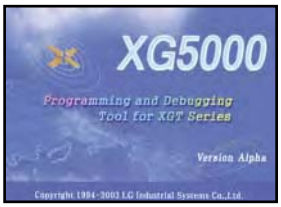


Special

Software

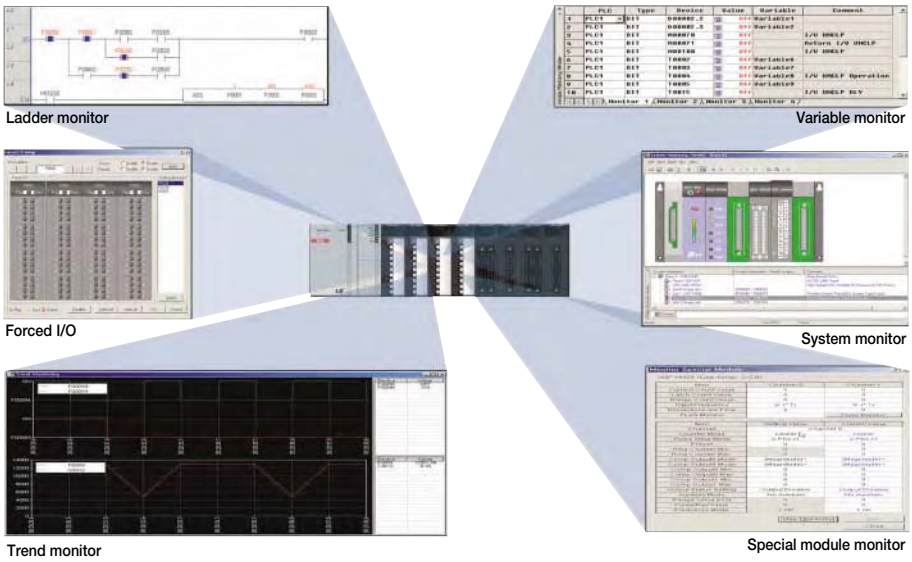
Software innovation for integrated solution.

XG5000 is the optimum software which can cover various programming needs, debugging, and easy maintenance. Especially, XG-PD achieves customer satisfaction with useful maintenance tool by internet.



Programming software XG5000

- Program editing & Engineering software
- Windows-based easy operation
- Multi-PLC, Multi-programming support
- Various monitoring and diagnosis functions
- Windows 2000, XP (Limited use in Windows 98, ME)



Programming
XG5000

Easy how to use
Letter type, color, short key, tool bar

Convenient editing
Undo, Redo, Excel editing

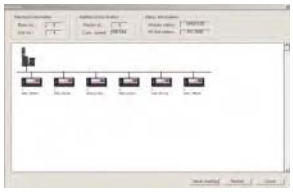
Structuralized program
Scan, task (Initialization, normal cycle, external contact point, internal device)

Various monitoring
Special module, trend, user-event, etc

Network set up, diagnosis
XG-PD

Communication module parameter setting
Basic, high-speed link parameter setting

System diagnosis and monitoring
Ping/Self test
Monitoring of sending/receiving frame
Display of status and diagnosis of each module



Positioning
APM S/W Package

Easy parameter setting

Data editing in Excel

Monitoring and trace

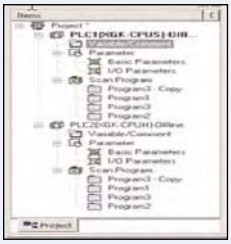
Features

- Program editing & Engineering software
- Windows-based easy operation
- Multi-PLC, Multi-program, Multi-task in one project
- Various monitoring and diagnosis functions
- Windows 2000, XP (Limited use in Windows 98, ME)

Programming tools

MPMP (Multi-PLC Multi-programming)

Different PLC systems can be edited, monitored, and managed simultaneously in one project.



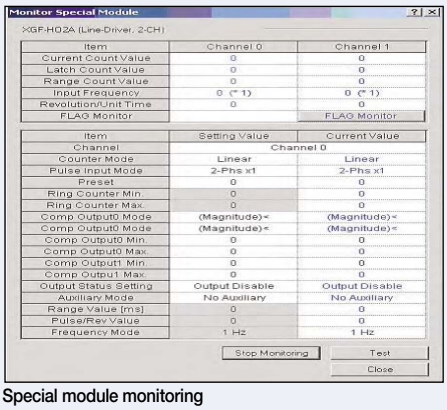
Drag & Drop

It is available in project, variable/comment, ladder diagram editing and monitoring.

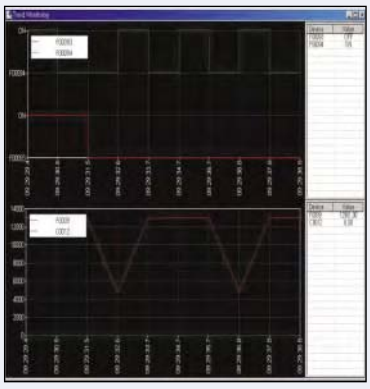
User-defined shortcut keys

User-defined shortcut keys increase editing convenience.

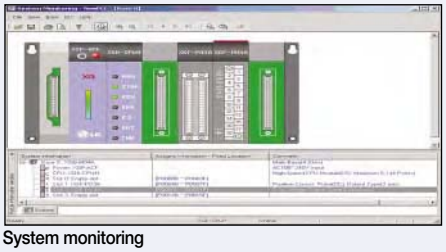
Monitoring



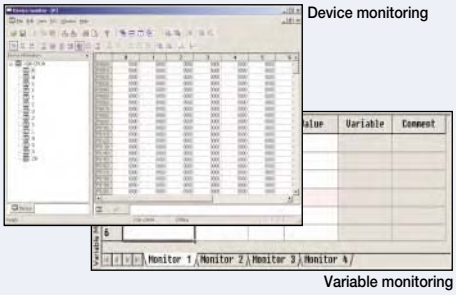
Special module monitoring
Monitoring and test-run of various special modules are available.



Trend monitoring
The changing value of specific device can be monitored and saved as a file.



System monitoring



Device monitoring

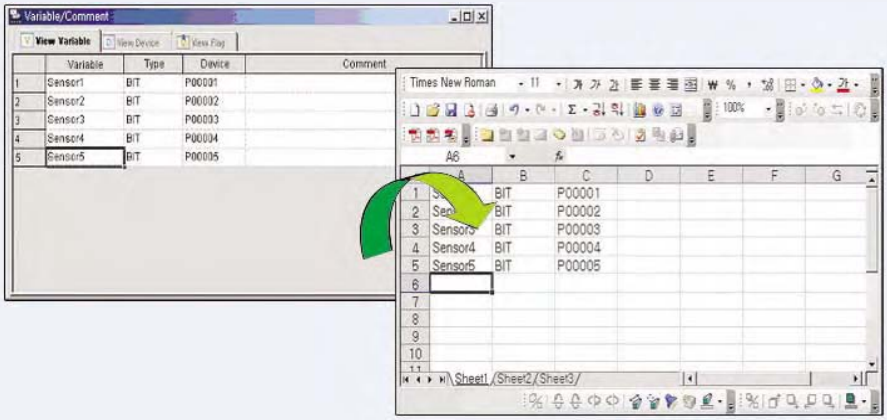
Variable monitoring

System requirement

Item	System requirement
O/S	Windows 2000, XP (Limited use in Windows 98, ME)
CPU	IBM compatible PC with Min. 200MHz Pentium processor
Memory	Min. 128M
HDD	100 MB (Free memory space)
Serial port	Communication port for program transmission (RS-232C, USB)
Printer	Compatible with Windows 98 or later
Mouse	Compatible with Windows 98 or later

Variable and programming editing

- Data input like EXCEL
- Cell-unit edit
- Auto Fill function
- Compatible with Microsoft Excel
- Redo and Undo (Unlimited)
- Segment screen edit

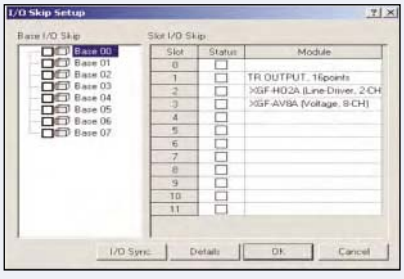


Improved diagnosis and maintenance

Module exchange wizard
It supports safe module exchange during 'RUN' mode.

User-defined event
By registering user-defined event, users can read the record of specified event and use it for PLC operation and debugging.

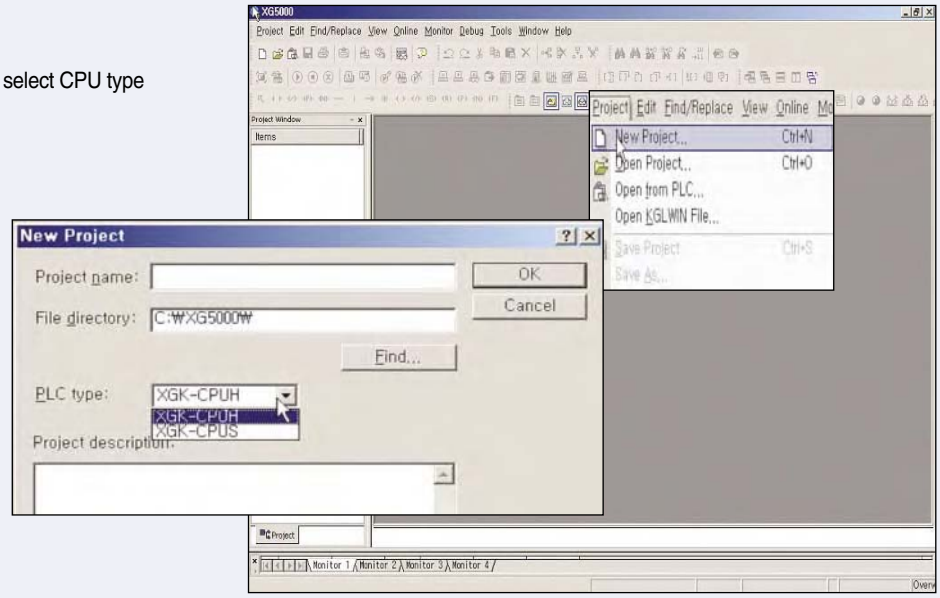
Forced I/O
The status of external output device can be checked without program.
And when input device breaks down, forced input function specifies ON/OFF and can operate the system without interruption of equipment.



I/O skip, Error Mask
I/O inspection and renewal can be set for specific module and continuous operation is available when an error is occurred.

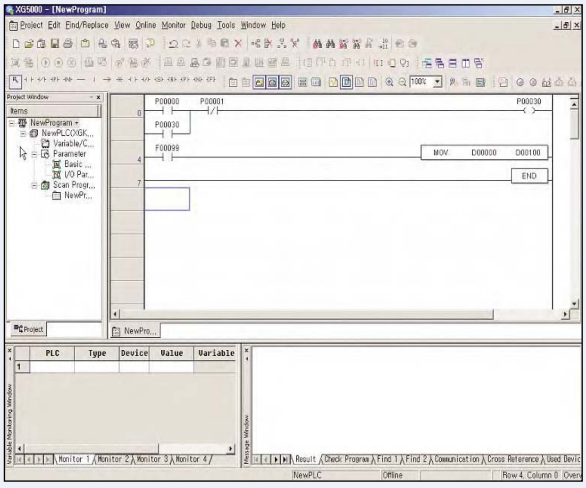
Program editing

- Start XG5000
- Select [New Project]
- Write project name and select CPU type



Configure ladder lines as below with ladder input tool bar

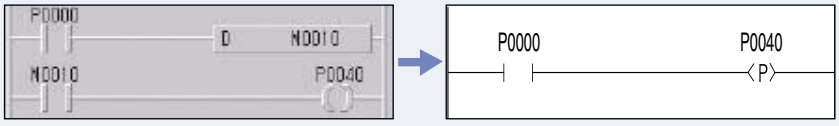
- Select input point and command with ladder tool bar.



Icon	Description	Short key
	Arrow mode	ESC
F3	Normally open contact	F3
F4	Normally closed contact	F4
SF1	Positive transition-sensing contact (On for 1 scan when Off-->On)	Shift+F1
SF2	Negative transition-sensing contact(On for 1 scan when On-->Off)	Shift+F2
F5	Horizontal line	F5
F6	Vertical line	F6
SF8	Fill horizontal line.	Shift+F8
F9	Coil	F9
SF9	NOT instruction contact	Shift+F9
F11	Negated coil	F11
SF3	SET coil	Shift+F3
SF4	RESET coil	Shift+F4
SF5	Positive transition-sensing coil (On for 1 scan when Off-->On)	Shift+F5
SF6	Negative transition-sensing coil (On for 1 scan when On-->Off)	Shift+F6
F10	Function	F10

Note) Addition of 'EDGE' detection instructions

Develop user-friendly programming through adding D, D NOT instructions (Rising EDGE, dropping EDGE) to contact and output coil.



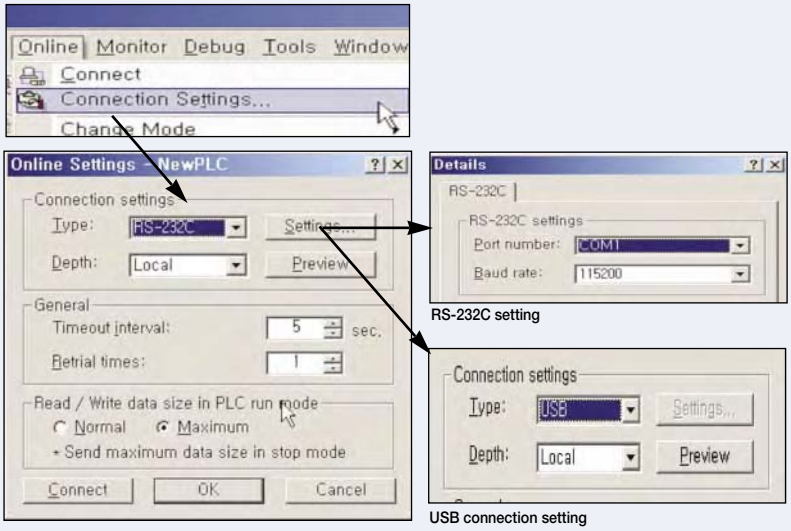
Program download

Connection setting

- Check a setting for connection between XGT and XG5000
- XGT supports USB and RS-232C

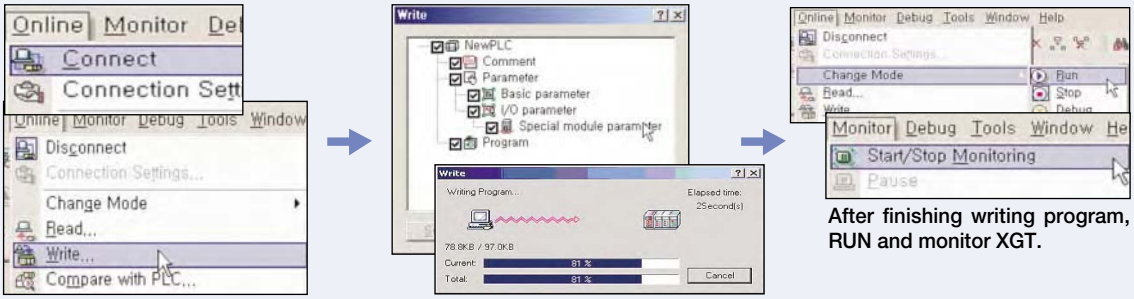
Set up communication port and download speed

* using 'USB TO RS-232C' converter, 115,200bps connection may be unavailable depending on characteristics of converter. In this case, change the communication speed to 38,400bps.



Connection

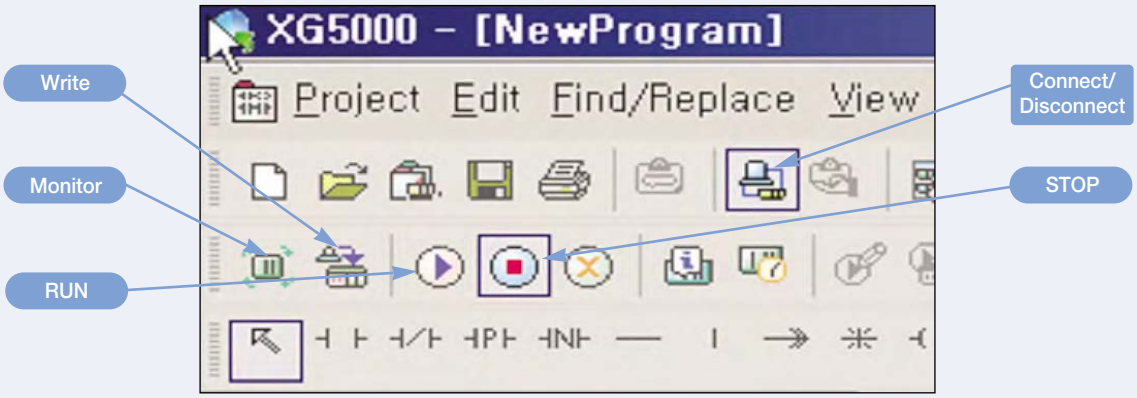
Connect to PLC and download the program as below.



After finishing writing program, RUN and monitor XGT.

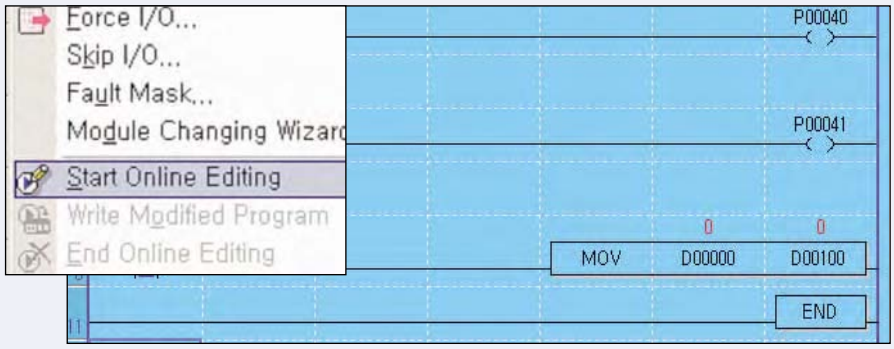
Short icon

* XGT doesn't support collective-writing monitoring for system safety.



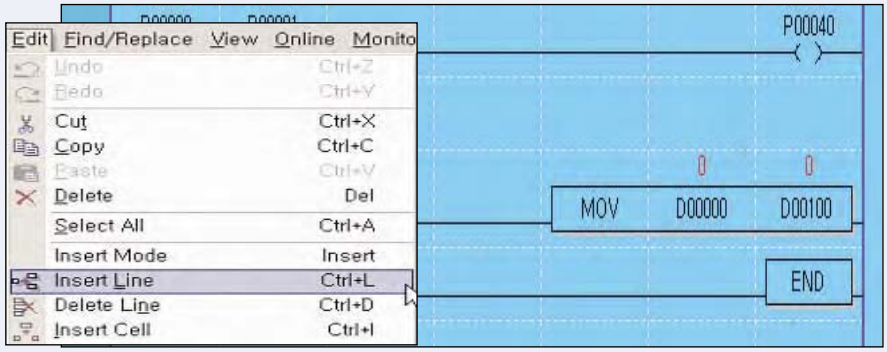
Online Editing

Select [Start Online Editing] in Online menu.



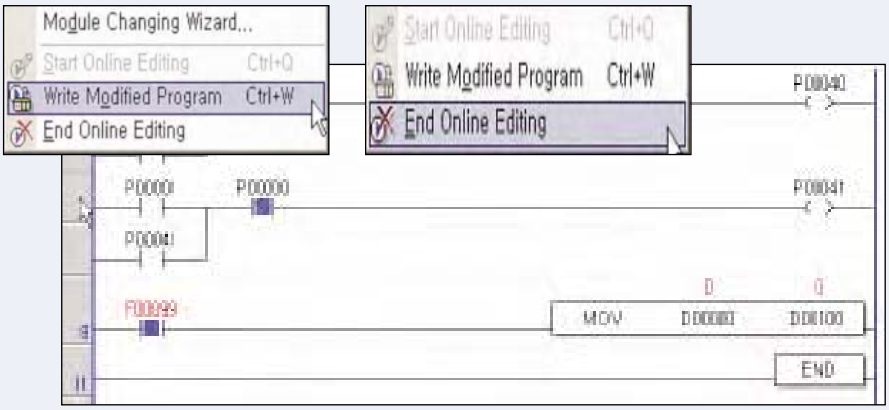
When starting Online Editing, the screen color becomes blue.

Modify the program.



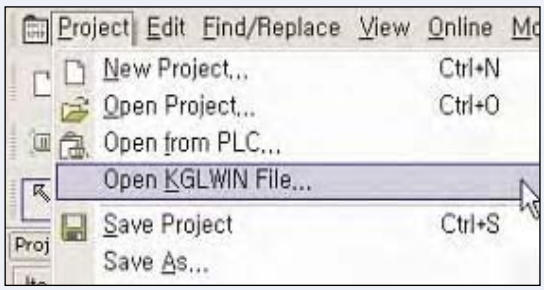
Edit menu

After finishing modifying the program, select [Write Modified Program] and [End Online Editing].

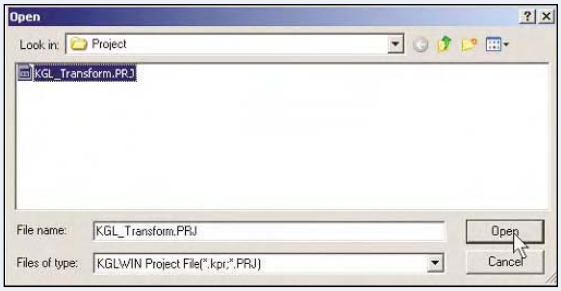


After finishing 'Online Editing'

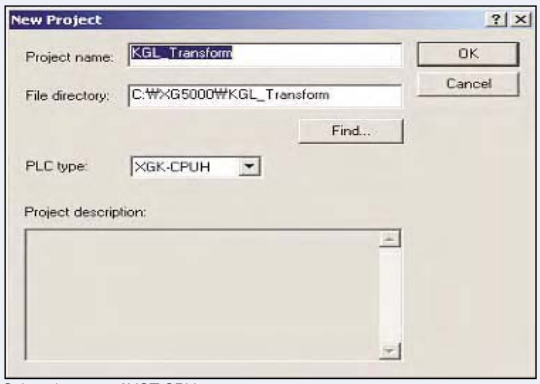
Open a project written in KGL-WIN



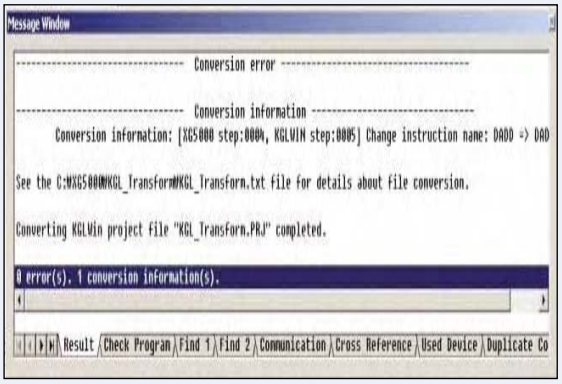
Select [Open KGWIN file] in project.



Select the file.

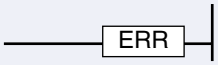


Select the type of XGT CPU.


Message Window
Conversion error
Conversion information
Conversion information: [XG5000 step:0004, KGLWIN step:0005] Change instruction name: DADD => DAD
See the C:₩XG5000₩KGL_Transform₩KGL_Transform.txt file for details about file conversion.
Converting KGLWin project file "KGL_Transform.PRJ" completed.
0 error(s), 1 conversion information(s).
Result Check Program Find 1 Find 2 Communication Cross Reference Used Device Duplicate Co

Check converted information in the message window.

Note) Dedicated instructions and special parameters for MASTER-K cannot be converted.
Mostly General instructions and descriptions are converted.
Information impossible to be converted is displayed as ERR.

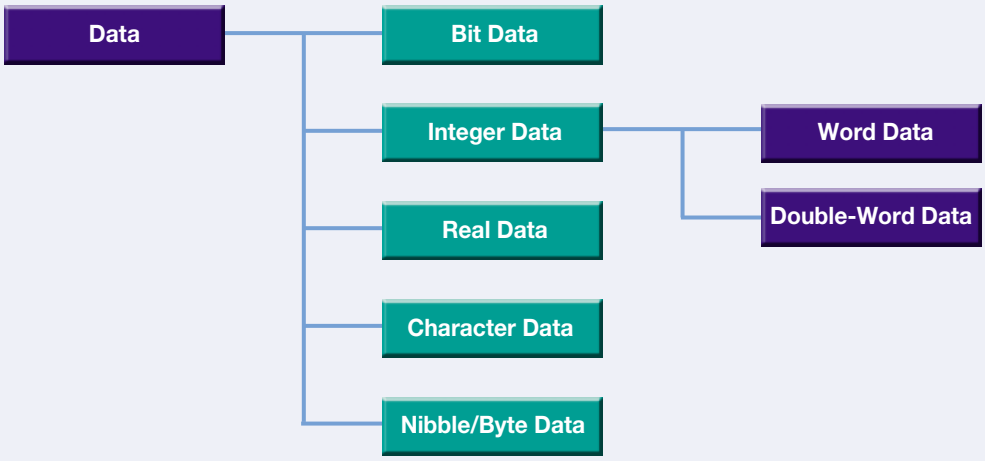


• Content of main special flag (F) change

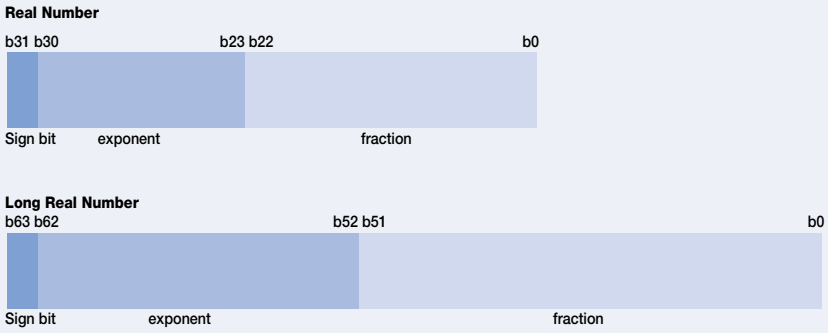
MASTER-K	XGT	Specifications
F10	F99	ON regularly
F11	F9A	OFF regularly
F12	F9B	ON during first one scan
F13	F9C	OFF during first one scan

For more detailed information, refer to user's manual.

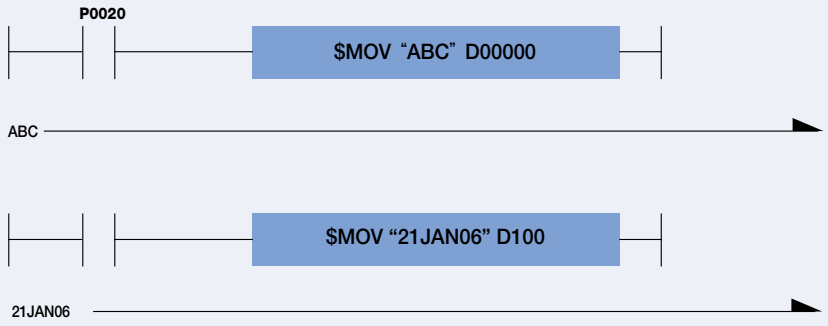
Data type



- Nibble: 4-bit unit data
- Byte: 8-bit unit data
- Real Data: 32-bit/64-bit floating point data



- Character Data: Saving numbers, alphabets, symbols as a type of ASCII code



D100	Ox31	Ox32
D101	Ox41	Ox4A
D102	Ox30	Ox4E
D103	Ox00	Ox36
D104	Ox00	Ox36

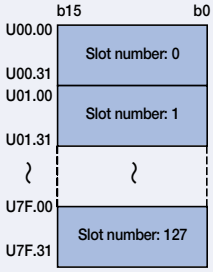
Device Type

Device	Size	Bit Contact	Word Data	Name
P	32768 points	P00000 ~ P2047F	P0000 ~ P2047	I/O Relay
M	32768 points	M00000 ~ M2047F	M0000 ~ M2047	Assistant Relay
L	180224 points	L00000 ~ L11263F	L0000 ~ L11263	Link Relay
N *1)	21K words	N/A	N00000 ~ N21503	Comm. data register
K	32768 points	K00000 ~ K2047F	K0000 ~ K2047	Keep Relay
F	32768 points	F00000 ~ F2047F	F0000 ~ F2047	Special Relay
T *2)	2048 points	T0000 ~ T2047	T0000 ~ T2047	Timer
C *3)	2048 points	C0000 ~ C2047	C0000 ~ C2047	Counter
U	3072 words	U00.00.0 ~ U7F.31.F	U00.00 ~ U7F.31	Special Module Counter
Z	128 words	N/A	Z0 ~ Z127	Index Register
S	128 groups	S00.00 ~ S127.99	N/A	Step Control Relay
D	32K words	D00000.0 ~ D32767.F	D00000 ~ D32767	Data Register
R (Internal RAM) *4)	32K words	R00000.0 ~ R32767.F	R00000 ~ R32767	File Register
ZR (Internal RAM) *5)	32K words	N/A	ZR00000 ~ ZR65535	File Register
R (Expanded)	1M words	N/A	Available as much as extension size	File Register
ZR (Expanded)	1M words	N/A	Available as much as extension size	File Register

Note) 1. When communication module is not used, it can be used as internal data area.
2. Word data in timer shows a current value of relevant bit contact.
3. Word data in counter shows a current value of relevant bit contact
4. Even when using more than 32K words internal RAM, bit contact available to display is R00000.0~R32767.F Also word data enable to be displayed in the range of R00000.0~R32767.F
5. When internal RAM is more than 32K words, bit contact can be in the range of ZR00000.0~ZR32767.F and word data can be displayed as much as the size of internal RAM

Special module register U

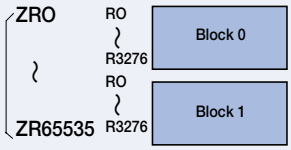
Register for reading data from special module mounted in slot



- Assigning 32 words per slot in U area
- Bit type display available
  Ex) U93.12.x (x: Bit location, Hexadecimal display)
- Available to read/write internal memory value of special module without using PUT (P), GET (P), PUTS (P), GETS (P)
- Basic display in U area
  Ex) Uxy.z
  x: Base number (0~7)
  y: Slot number (0~F)
  z: Word number of special module internal memory

File register R, ZR

Register that a recorded value is not deleted when power failure is occurred. File register is used for data backup or data storage.

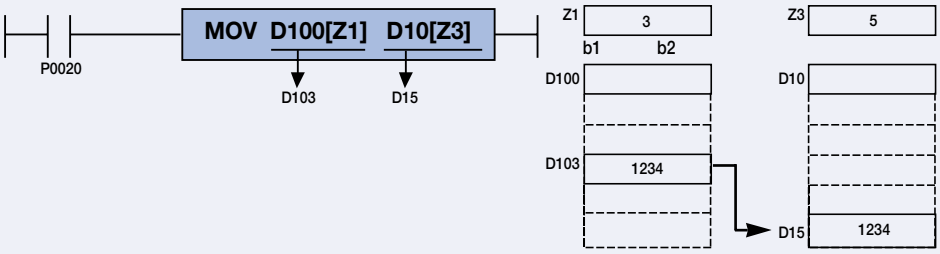


R: Block unit access
ZR: Entire file register access

Internal RAM (Temporary preservation): 32K words
FLASH (Permanent preservation): 1M words

Index register

Index register sets up devices using index function.
The sum of index register value and directly specified device number is real device number.

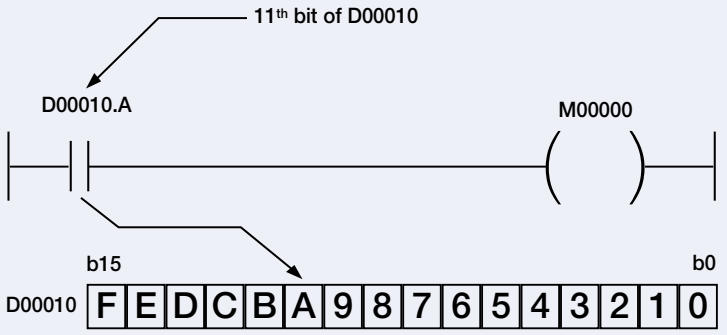


Available Device

- Bit Device: P, M, L, K, F, T, C
- Word Device: U, D, R, ZR, N, present value of T and present value of C

Ex) MOV T1[Z1] D10 : If Z1 is 5, present value of T(1+5)=T6 is transmitted to D10.
Ex) LOAD D10[Z1].5 : If Z1 is 5, LOAD(10+5).5 => LOAD D15.5 is set.

Bit specifying method of word device



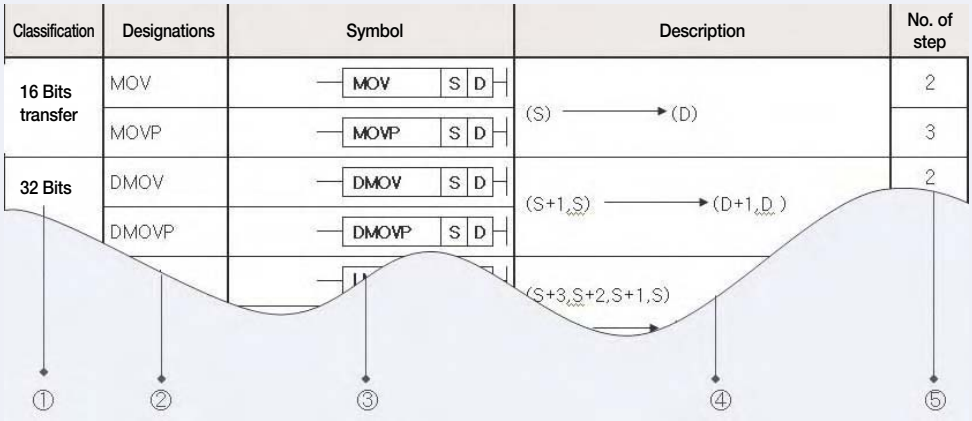
By assigning bit number to word device, bit data is available to use.

Word device number	.	Bit number

In this case, word device number should be addressed as decimal and bit number should be addressed as hexadecimal.

Relevant Device: U, D, R

Instructions



① Classification: Classifies instructions into applications.

② Designations: Displays instruction names to be used in program.

- Display rules: Instructions shall be basically displayed in word unit. According to data size, operation characteristics, real number data process, text process, the rules are as follows;
- Based on Data Size & Type

D: Double Word related instruction.
R: Real Number related instruction.
L: Long Real Number related instruction.
However, LMOV is 64 Bits transfer instruction.
$: String related instruction.
G: Group calculation.
4: Nibble related instruction, used only at the back of instruction.
8: Byte related instruction, used only at the back of instruction.
3: Instruction that process 3 operands, used only at the back of instruction.

- Based on Operation Characteristics

P: Instruction that is executed for 1 scan when input signal is changed OFF => ON

③ Symbol: Displays symbols used in program, showing the number of used operands and the type of Source or Destination. Operand display rules are as follows;

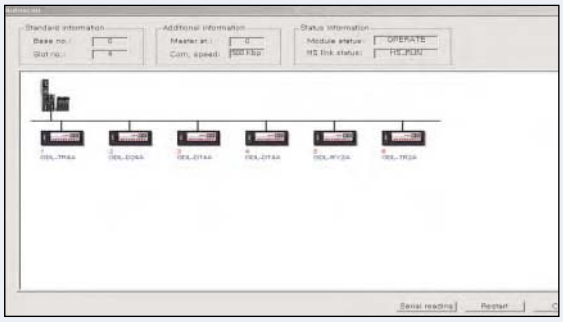
S: Source, with data value not changed after calculated.
D: Destination, with data value changeable after calculated.
N, n: The number to process.
St, En: Start and End, used only in BSFT & WSFT.
Sb: Source in case Bit position is specified, mostly used in Nibble/Byte instruction.
Db: Destination in case Bit position is specified.
Z: Control word, which means previously specified format as based on each instruction.

④ Description: Describes general functions of instruction.

⑤ No. of step: The number of basic steps of instruction, which means the number of steps in case indirect specification, index formula and direct variable input were not used.

Features

- Convenient user-program, network initial basic setting
- Providing extended monitoring, control function of network system and communication module
- Fast interface with CPU by efficient network management
- Unification of instruction system
- Simple and easy connection using dedicated driver (XGT) and other driver (MODBUS)
- Various built-in Diagnosis functions (Link, Auto-scan, Frame, etc.)

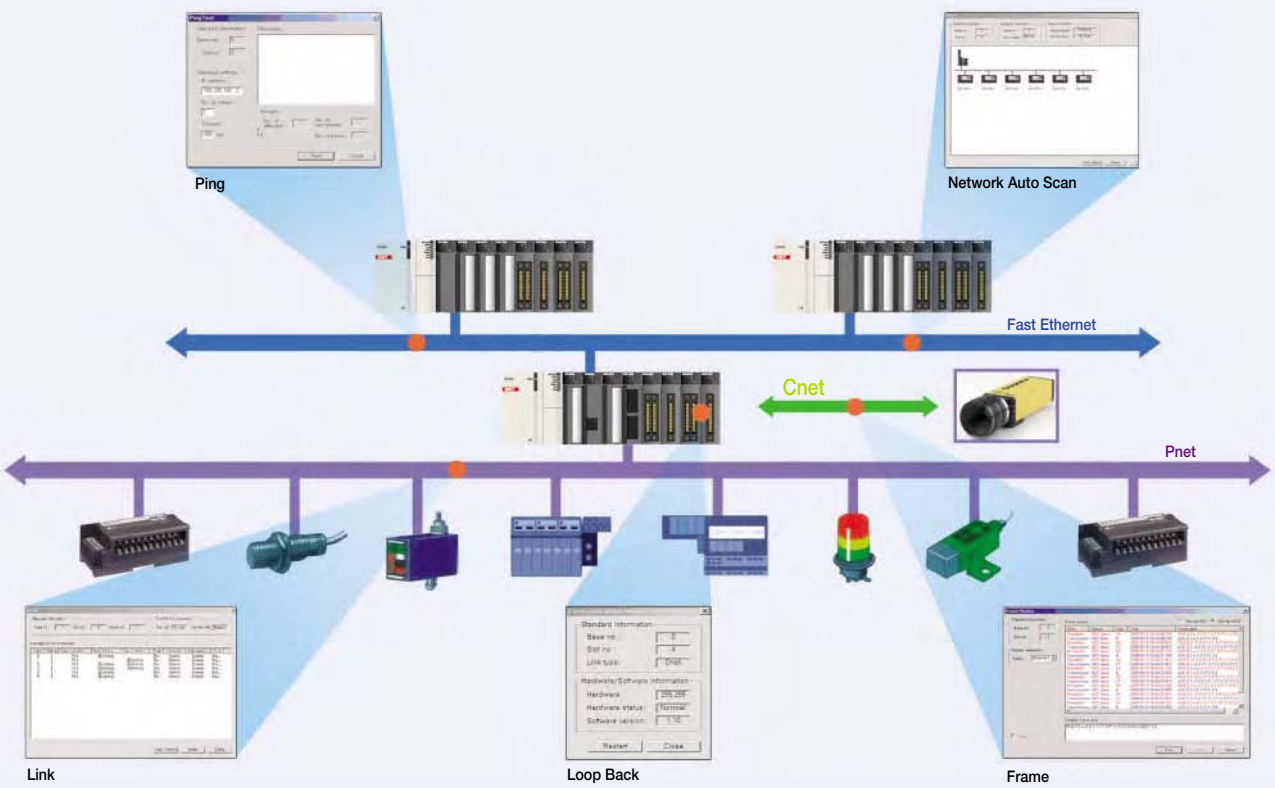


Item		RAPIEnet	FEnet	FDEnet	IFOS FEnet	Cnet	Rnet	DeviceNet	Profibus-DP
Service	High speed link	O	O	O	O	-	O	O	O
	XGT server protocol	-	O	-	O	O	-	-	-
	MODBUS server protocol	-	O	-	O	O	-	-	-
	P2P	-	O	O	O	O	-	-	-
	XG5000 Service	O	O	O	O	O	O	-	-
High speed link	Max. station	64	64	64	64	-	64	64	126/123
	No. of block	128	128	128	128	-	64	64	126
	Send block	64	32	32	32	-	32	64	126
	Receive block	128-Send block				-	32	64	126
	Data per block	200 words				-	60 words	25 6bytes	244bytes
P2P	No. of block	-	64	64	64	64	-	-	-
	Data per block	-	1st , 2nd stage connection			256 words	-	-	-
	Service	-	User defined, XGT client, Modbus client				-	-	-
System diagnosis		Connection status, network status							
Media		10/100Base-T/FX			100Base-FX	900~115200bps	1Mbps	125/250/500Kbps	9.6K~12Mbps
Topology		Ring, Bus	Star	Ring, Bus	Star	Bus	Bus	Bus, Star	Bus
Configration Tool		XG-PD						XG-PD/SyCon	

Various network diagnosis and monitoring

- Auto Scan: Searching and displaying each node connected to network
- Link Monitor: Monitoring status of high-speed link communication of each station
- Frame Monitor: Collecting and displaying sending/receiving frame in real time

Item	FEnet Fast Ethernet	FDEnet Dedicated Ethernet	Cnet	Pnet	Dnet
Auto Scan	●	●	●	●	●
Link Monitor	●	●	●	●	●
Frame Monitor	—	—	●	—	—

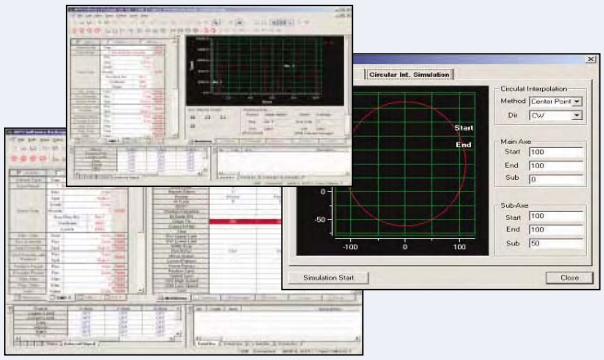


Software

Software / APM[Positioning module] Software Package

Features

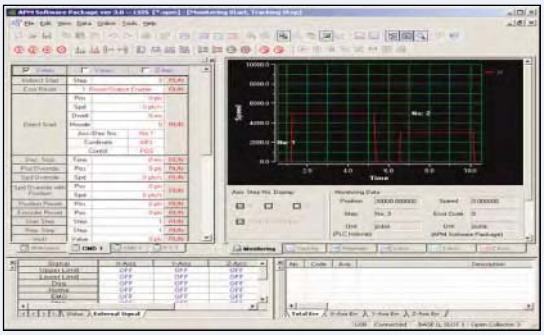
- Windows-based easy operation
- Supporting all types of LS APM module
- Improved parameter editing (Copy, Paste, Initialization, etc.)
- Various monitoring (Operation type of each axis, etc.)
- Profile trace and operation monitoring
- Profile graph and simulation of circular interpolation
- Available to edit operation parameter in EXCEL



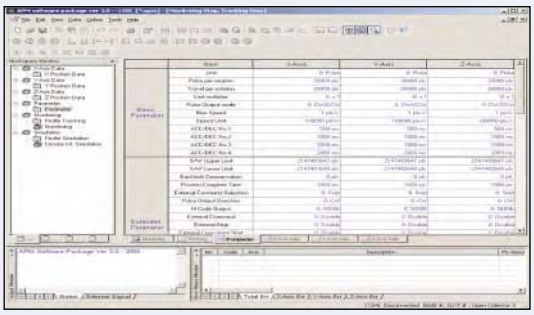
Step	Cord	Control	Pattern	Method	Address [pulse]	Sub Address [pulse]	M Code	A/D No.	Speed [pls/s]	Dwell [ms]	Cir Int Dir
1	ABS	POS	END	SIN	10000	0	0	No.1	1000	0	CW
2	ABS	POS	END	SIN	0	0	0	No.1	0	0	CW
3	ABS	POS	END	SIN	0	0	0	No.1	0	0	CW
4	ABS	POS	END	SIN	0	0	0	No.1	0	0	CW
5	ABS	POS	KEEP	SIN	100000	0	0	No.1	0	0	CW
6	ABS	POS	END	SIN	0	0	0	No.1	10000	0	CW
7	ABS	POS	END	SIN	0	0	0	No.1	10000	0	CW
8	ABS	POS	END	SIN	0	0	0	No.1	0	0	CW
9	ABS	POS	END	SIN	0	0	0	No.1	0	0	CW
10	ABS	POS	CONT	SIN	100000	0	0	No.1	0	0	CW
11	ABS	POS	END	SIN	1000	0	0	No.1	10000	0	CW
12	ABS	POS	END	SIN	0	0	0	No.1	5000	0	CW

Operation Data
Define operation method, target location, operation speed of each axis.

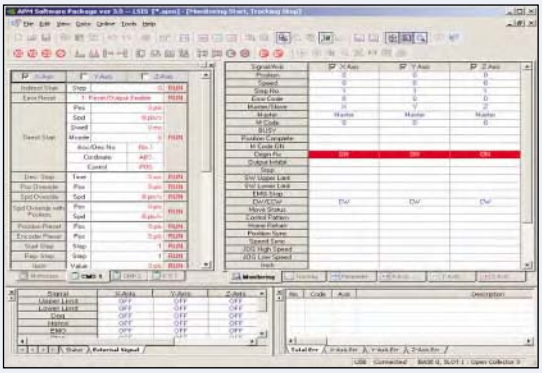
Profile simulation (Off-line)
Monitoring operation speed of each axis with graph type and saving result as image file.



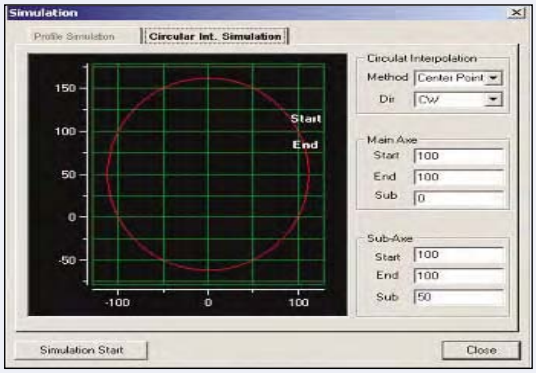
Profile Trace (On-line)
Monitoring operation speed of each axis with graph type and saving result as image file.



Operation parameter
Setting basic operation characteristics and limit value.



Monitoring (On-line)
Checking basic operation characteristics about each axis and monitoring operation condition.



Circular interpolation simulation (Off-line)

Product list

CPU / PWR / Base / I/O

CPU	XGI-CPUU	6,144pt (IEC type), Program memory: 1Mbyte
	XGI-CPUH	6,144pt (IEC type), Program memory:1.5Mbyte
	XGK-CPUU	6,144pt, Program memory : 128Ksteps
	XGK-CPUH	6,144pt, Program memory : 64Ksteps
	XGK-CPUA	3,072pt, Program memory : 32Ksteps
	XGK-CPUS	3,072pt, Program memory : 32Ksteps
	XGK-CPUE	1,536pt, Program memory : 16Ksteps
Power	XGP-ACF1	Free Voltage/DC5V 3A, DC24V 0.6A
	XGP-ACF2	Free Voltage/DC5V 6A
	XGP-AC23	220V/DC5V 8.5A
	XGP-DC42	DC24V/DC5V 6A
Main base	XGB-M04A	4 Slot
	XGB-M06A	6 Slot
	XGB-M08A	8 Slot
	XGB-M12A	12 Slot
Expansion base	XGB-E04A	4 Slot
	XGB-E06A	6 Slot
	XGB-E08A	8 Slot
	XGB-E12A	12 Slot
Input	XGI-A12A	AC110V, 16pt
	XGI-A21A	AC220V, 8pt
	XGI-D21A	DC24V, 8pt
	XGI-D22A	DC24V, 16pt, Sink/Source
	XGI-D22B	DC24V, 16pt, Source
	XGI-D24A	DC24V, 32pt, Sink/Source
	XGI-D24B	DC24V, 32pt, Source
	XGI-D28A	DC24V, 64pt, Sink/Source
	XGI-D28B	DC24V, 64pt, Source
Output	XGQ-RY1A	Relay, 8pt
	XGQ-RY2A	Relay, 16pt
	XGQ-RY2B	Relay, 16pt, Surge killer
	XGQ-SS2A	Triac, 16pt
	XGQ-TR2A	Transist, 16pt, Sink
	XGQ-TR2B	Transist, 16pt, Source
	XGQ-TR4A	Transist, 32pt, Sink
	XGQ-TR4B	Transist, 32pt, Source
	XGQ-TR8A	Transist, 64pt, Sink
	XGQ-TR8B	Transist, 64pt, Source
Input/output	XGH-DT4A	DC24V 16pt, Transist, 16pt, Sink

Communication module

RAPIEnet	XGL-EIMT	RAPIEnet Twisted pair
	XGL-EIMH	RAPIEnet Twisted pair/ Fiber
	XGL-EIMF	RAPIEnet Fiber optic 2ch
	XOL-EIMT	RAPIEnet Twisted pair 2ch
	XOL-EIMF	RAPIEnet Fiber optic 2ch (PC)
Cnet	XGL-CH2A	RS-232C/RS-422
	XGL-C22A	RS-232C, 2ch
	XGL-C42A	RS-422, 2ch
Ethernet	XGL-EFMF	Fiber optic, Open type
	XGL-EFMT	Twisted pair, Open
	XGL-ESHF	Fast Ethernet type (Industrial optic ring)
	XGL-EHST	Fast Ethernet switch hub
Dedicated	XGL-EDMF	Fiber optic, Dedicated
	XGL-EDMT	Ethernet Twisted pair, Dedicated Ethernet
Rnet	XGL-RMEA	Rnet, Master
Dnet	XGL-DMEA	DeviceNet, Master
Pnet	XGL-PMEA XGL-PMEC	Profibus-DP, Master

Special module

Analog input	XGF-AV8A	Voltage, 8ch
	XGF-AC8A	Current, 8ch
	XGF-AD8A	Voltage /Current, 8ch
	XGF-AD4S	Voltage /Current, 4ch,
	XGF-AD16A	Insulation Voltage /Current, 16ch
Analog output	XGF-DV4A	Voltage, 4ch
	XGF-DC4A	Current, 4ch
	XGF-DV8A	Voltage, 8ch
	XGF-DC8A	Current, 8ch
	XGF-DV4S	Voltage, 4ch, Insulation
	XGF-DC4S	Current, 4ch, Insulation
High speed counter	XGF-HO2A	Open collector, 2ch
	XGF-HD2A	Line drive, 2ch
Positioning	XGF-PO3A	Open collector, 3axes
	XGF-PO2A	Open collector, 2axes
	XGF-PO1A	Open collector, 1axis
	XGF-PD3A	Line drive, 3axes
	XGF-PD2A	Line drive, 2axes
	XGF-PD1A	Line drive, 1axis
Temperature input	XGF-TC4S	Thermo couple, 4ch, Insulation
	XGF-RD4A	RTD, 4ch
	XGF-RD4S	RTD, 4ch, Insulation
Temperature controller	XGF-TC4UD	4 loops, Insulation

Cable

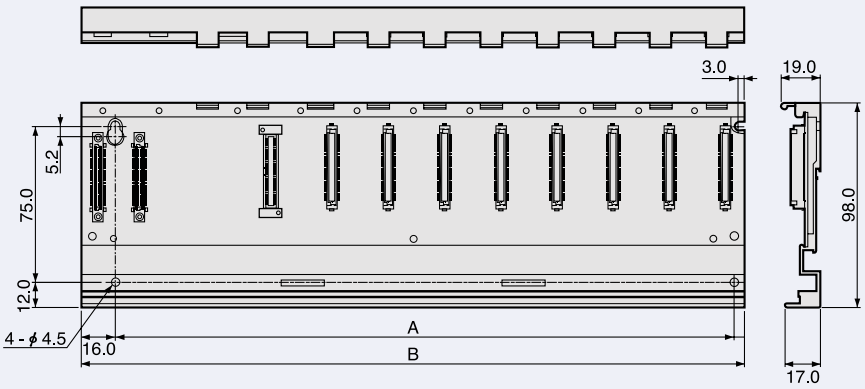
Item	Product	Description
Expansion cable	XGC-E041	0.4m
	XGC-E061	0.6m
	XGC-E121	1.2m
	XGC-E301	3.0m
	XGC-E501	5.0m
	XGC-E102	10m
	XGC-E152	15m
Termination connector	XGT-TERA	Termination connector for expansion base download cable
USB cable	USB-301A	USB download cable
RS232C cable	K1C-050A	RS232C download cable
Dummy	XGT-DMMA	Dummy module

XGR module

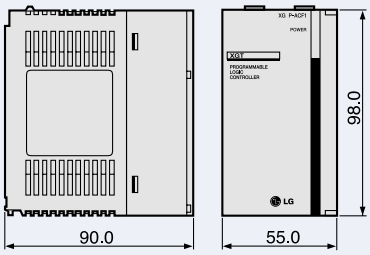
CPU	XGR-CPUH/T	Twisted pair
	XGR-CPUH/F	Fiber optic
Power	XGR-AC12	110V, 5.5A (Main base)
	XGR-AC13	110V, 8.5A (Expansion base)
	XGR-AC22	220V, 5.5A (Main base)
	XGR-AC23	220V, 8.5A (Expansion base)
Base	XGR-M06P	6 Slot (Main base)
	XGR-E12P	12 Slot (Expansion base)
Expansion drive	XGR-DBST	Twisted pair - Twisted
	XGR-DBSF	pair Fiber optic - Fiber optic
	XGR-DBSH	Twisted pair - Fiber optic
Sync & Expansion cable	XGC-F201	2m (Fiber optic)
	XGC-F501	5m (Fiber optic)

Dimensions

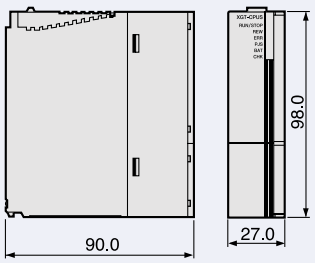
• Base



• Power module



• CPU and I/O module



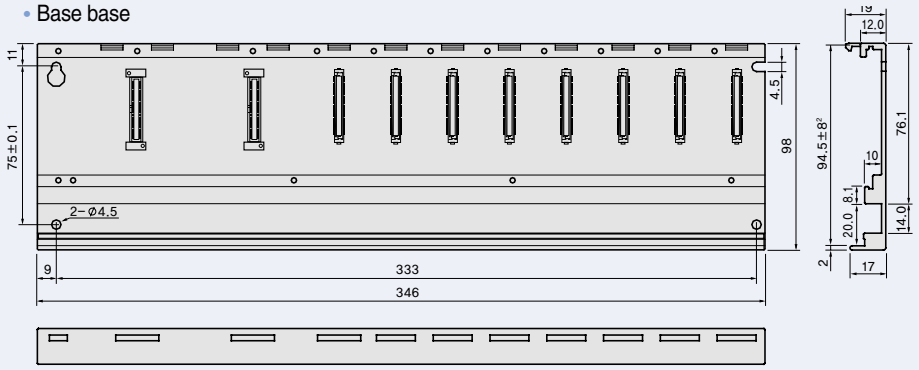
Base Dimensions (W)

Item	XGB-M04A/E04A	XGB-M06A/E06A	XGB-M08A/E08A	XGB-M12A/E12A
A	190	244	298	406
B	210	264	318	426

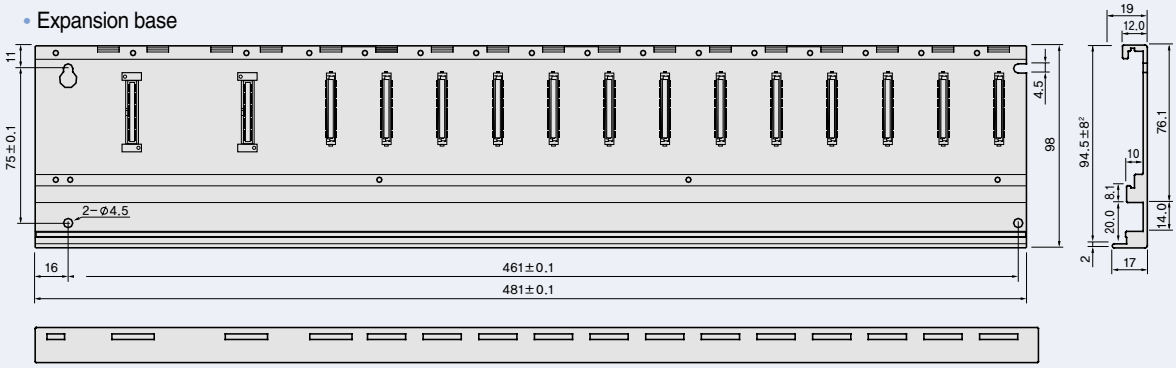
XGR Dimensions

Dimensions

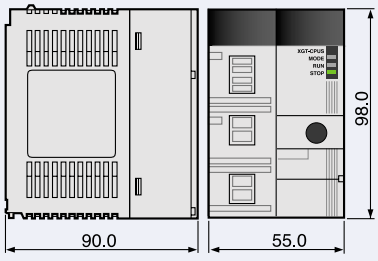
• Base base



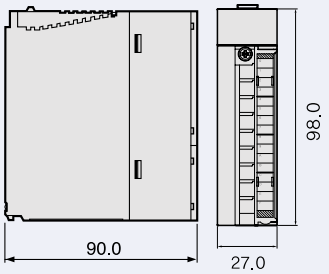
• Expansion base



• Power and CPU



• I/O



Base Dimensions (W)

Item	XGR-M06P	XGR-E12P
A	333	461
B	346	481

Product